



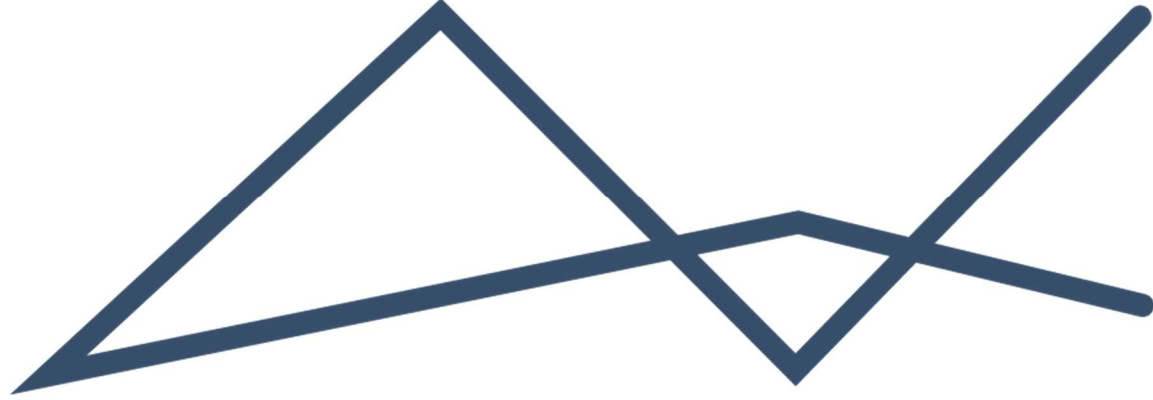
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SCOPING REPORT

PROPOSED KALGOLD EXPANSION PROJECT





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Table of Contents

1	Introduction	1
1.1	Report Structure	3
1.2	Details of the EAP.....	6
1.3	Specialist Consultants	6
2	Description of the Property	8
3	Description and Scope of the Proposed Project	11
3.1	Resource Details.....	11
3.2	Main Mining Actions, Activities and Processes Occurring on Site	11
3.3	Description of Activities to be Undertaken	12
3.4	Listed and Specified Activities Triggered.....	15
4	Policy and Legislative Context.....	24
4.1	Applicable National Legislation	28
5	Need and Desirability of the Proposed Project.....	42
6	Project Alternatives	55
6.1	Activity Alternatives	55
6.2	Location Alternatives	55
6.3	Design or Layout Alternatives	55
6.4	No-Go Alternative	57
7	Stakeholder Engagement.....	58
7.1	Legal Compliance	58
7.2	Identification of Interested and Affected Parties.....	59
7.3	Scoping Report Notification of I&APs	59
7.4	Scoping Report Review Period	61
7.5	Public Meeting	61
7.6	comments and Reponses	61
8	Environmental Attributes and baseline	62
8.1	Topography And Regional Drainage.....	62
8.2	Geology And Soils.....	64
8.3	Climate	67
8.4	Land Capability.....	67
8.5	Social, Demographics and Employment Statistics	67
8.6	Cultural and Heritage Resources.....	69
8.7	Flora	71
8.8	Fauna.....	73
8.9	Hydrology and Wetlands.....	75
8.10	Wetlands	78
8.11	Geohydrology (Groundwater).....	81



8.12	Air Quality	90
9	Environmental Impact Assessment.....	95
9.1	Impact Assessment Methodology.....	95
9.2	Impacts Identified	99
9.3	Description and Preliminary Assessment of Impacts.....	105
10	Plan of Study for the Impact Assessment	115
10.1	Description of Alternatives to be Considered	115
10.2	National Web Based Environmental Screening Tool.....	115
10.3	Description of the Aspects to be Assessed as Part of the Environmental Impact Assessment Phase 117	
10.4	Aspects to be Assessed by Specialists	118
10.5	Proposed Method of Assessing Environmental Aspects.....	126
10.6	Proposed Method for Assessing Duration Significance	126
10.7	Stages at which Competent Authorities will be Consulted	126
10.8	Proposed Method of EIA Phase Public Participation	126
10.9	Description of Tasks that will be Undertaken During the EIA Process.....	126
10.10	Measures to Avoid, Reverse, Mitigate, or Manage Impacts.....	127
11	Sensitivity Mapping.....	128
12	Assumptions, Limitations and Uncertainties	131
12.1	Terrestrial Ecology.....	131
12.2	Freshwater Ecology	131
12.3	Agricultural Potential	131
12.4	Hydrology (Surface Water).....	132
12.5	Geohydrological (Groundwater)	132
12.6	Air Quality	132
12.7	Heritage.....	133
12.8	Social	133
13	Undertakings.....	134
13.1	Undertaking Regarding Correctness of Information.....	134
13.2	Undertaking Regarding Level of Agreement.....	134
14	References	135
15	Appendices.....	137



List of Figures

Figure 1: Topographical locality map indicating the existing Kalgold properties and areas potentially affected by the expansion project.	9
Figure 2: Aerial imagery locality map indicating the existing Kalgold operation and areas	10
Figure 3: Preliminary layout of the proposed infrastructure for the expansion project	14
Figure 4: EIA process diagram	30
Figure 5: Authorisation processes for new water uses	31
Figure 6: Location alternatives considered during feasibility	56
Figure 7: Regional topography and drainage for the Kalgold Expansion Project area (MvB Consulting, 2021)...	63
Figure 8: Regional geological map	65
Figure 9: Land types in the study area.....	66
Figure 10: The climate summary for the region (Mucina & Rutherford, 2006).....	67
Figure 11: Overview of the Education Profile of RLM11 between 1996 and 2011	68
Figure 12: Overview of the Site-Specific Study Area’s Employment Profile	68
Figure 13: Preliminary heritage sensitivity map	70
Figure 14: Palaeontological Heritage Sensitivity map.	70
Figure 15: The Kalgold Expansion Project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018).....	72
Figure 16: Summary of hydrological setting	76
Figure 17. Initial surface water site identified site sensitives.....	77
Figure 18: NFEPA wetlands identified within range of the proposed development.	78
Figure 19: National Wetland Map 5	79
Figure 20: Infrastructure within a 500 m regulation area and surface flow direction	80
Figure 21: Schematic cross-section showing different aquifers	81
Figure 22: Regional groundwater gradient.....	83
Figure 23: Simulated groundwater drawdown at the end of mining (2034).....	85
Figure 24: Simulated TDS plume at the end of mining (2034).....	87
Figure 25: Comparison between contaminant plumes after 50 and 100 years – Post-closure alternative 1 (pits backfilled with waste rock and TSF capped)	88
Figure 26: Comparison between contaminant plumes after 50 and 100 years – Post-closure alternative 2 (pits open, WRD’s remain and TSF capped).....	89
Figure 27: Period, day- and night-time wind roses (Harmony Kalgold Station August 2019 – September 2020) 93	
Figure 28: Seasonal wind roses (Harmony Kalgold Station August 2019 – September 2020).....	94
Figure 29: Sensitivity mapping approach.....	129
Figure 30: Combined sensitivity map	130



List of Tables

Table 1: Rights, licenses, authorisations and permits held by Kalgold Mine.....	2
Table 2: Report structure.....	3
Table 3: List of specialists	7
Table 4: Locality details	8
Table 5: Listed activities in terms of the NEMA EIA Regulations (2014) as amended	16
Table 6: Waste management activities applicable to the expansion project.....	23
Table 7: Applicable legislation and guidelines overview	24
Table 8: Needs and desirability analysis for the Kalgold Expansion Project.....	43
Table 9: Plant Species of Conservation Concern (SCC) expected to occur within the region of the project area (BODATSA-POSA, 2016).	73
Table 10: List of bird species of regional or global conservation importance that are expected to occur at the site.	73
Table 11: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016).	74
Table 12: List of reptile species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; <i>Bates et al.</i> , 2014).	75
Table 13: Aquifer Classification	84
Table 14: Sensitive receptors within a 5km radius.....	90
Table 15: Criteria for Determining Impact Consequence.	95
Table 16: Probability Scoring.....	96
Table 17: Determination of Environmental Risk.....	96
Table 18: Significance Classes.....	97
Table 19: Criteria for Determining Prioritisation.	97
Table 20: Determination of Prioritisation Factor.....	98
Table 21: Final Environmental Significance Rating.....	98
Table 22: Identified environmental impacts.....	100
Table 23: Preliminary impact assessment.	106
Table 24: Screening tool studies.....	115
Table 25: Details of EIA scope of work	119
Table 26: Sensitivity rating and weighting.....	129



Appendices

Appendix A: Environmental Assessment Practitioner (EAP) Curriculum Vitae

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Specialist Reports

Appendix E: Impact Assessment Matrix

Appendix F: DEA Screening Tool Report



EXECUTIVE SUMMARY

Harmony Gold Mining Company (hereafter referred to as Harmony), has appointed Environmental Impact Management Services (Pty) Ltd. (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed expansion of the Kalgold production operation - hereafter referred to as the proposed Kalgold Expansion Project.

The existing Harmony Kalgold operation wishes to expand its current production from the current production rate of 130 000 tons per month to 300 000 tons per month. A pre-feasibility study has been undertaken. The findings of the pre-feasibility study have concluded that the following new activities and expansions must be provided for:

- The pit footprint will increase (bigger than what is being applied for in the EA amendment application)
- Larger dewatering pipelines (size to be determined after water balance is done)
- Extension to Spanover waste rock dump
- Road from the pit to new ROM pad.
- New ROM pad.
- New plant.
- Recommission old TSF at low deposition rate.
- Increase deposition rate at D-zone pit.
- Install pipeline from Central dam to the new plant.
- Install a tailings pipeline from the new plant to old TSF and D-zone pit.
- Pipeline from D-zone to the new plant.
- Pipeline from new plant to stream for discharge of treated water.
- Install two power lines from Ferndale substation to the new plant.
- Install evaporators at Central dam (to evaporate excess water).
- Install a water treatment plant at the new plant.
- Relocate and expand the explosives magazine.
- Additional new road from the plant to the N18.

Kalgold mine is an open pit mining operation located approximately 55km southwest of the town Mafikeng and 60km northeast of the town Stella in the Ratlou Local Municipality within the North West Province of South Africa. The mine is owned and operated by Harmony Gold, who acquired the mine in 1999. The mine is located in the Kraaipan Greenstone Belt, which is part of the large Amalia-Kraaipan Greenstone terrain. The largest ore body is found in the D-Zone, which was mined out by a single pit operation along a strike length of 1 300m and to a depth of approximately 290m below surface. Mining at Kalgold Mine continued at the A-Zone, Windmill and Watertank Open Pits.

It is anticipated that several listed activities contained in the National Environmental Management Act (Act 107 of 1998) (NEMA), National Water Act (Act 36 of 1998) (NWA), the National Environmental Management Air Quality Act (Act 39 of 2004) and the National Environmental Management Waste Act (Act 59 of 2008) (NEMWA) will be triggered by the proposed Kalgold Expansion Project. In this regard the Kalgold Expansion Project requires Environmental Authorization, amendment of the Water Use License, an Air Emissions License for the new processing plant as well as an amendment of the approved Environmental Management Programme (EMPr) and Mine Works Programme (MWP) for Kalgold mine.



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 MPRDA, and National Environmental Management Act (NEMA) in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on the 26th of March 2021 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 to be submitted to the DMRE. Should the DMRE 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 04th of May 2021 to the 03rd of June 2021. Please ensure all comments on the scoping report are submitted to EIMS by 03rd of June 2021. Contact details are provided below:

- Environmental Impact Management Services (Pty) Ltd (EIMS)
- P.O. Box 2083 Pinetown 2123
- Phone: 011 789 7170 / Fax: 011 787 3059
- Contact: Cheyenne Muthukarapan
- Email: kalgold@eims.co.za

PROJECT ALTERNATIVES AND ENVIRONMENTAL IMPACT ASSESSMENT

A scoping assessment was undertaken to identify all the potential risks and impacts associated with each phase of the proposed mining as well as potentially feasible alternatives. A broad range of alternatives including



location, process, technology and activity options were considered during scoping and the following will be assessed in more detail during the EIA phase:

- Design or Layout Alternatives – The preliminary layout will be further investigated in the EIA phase. If any infrastructure is planned to be located in areas identified as being of high environmental sensitivity or if any other significant environmental concerns are noted with regards to the proposed design and / or layout, then the layout may require to be amended based on these findings. More details regarding the preliminary layout and on-site sensitivities will be provided in the EIA phase once the detailed specialist impact assessment studies have been completed. This scoping phase micro-siting information will be provided to the specialists to inform their impact assessments during the EIA phase;
- No-go Alternative – The no-go option means ‘do nothing’ or the option of not undertaking the proposed Kalgold Expansion Project;

The background information from the existing Kalgold EMPr, project feasibility study and MWP documents as well as specialist studies undertaken for the proposed Kalgold Expansion project, including the screening of all the activities underway and planned to ensure that all the potential impacts have been identified. 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.

Most impacts identified were found to have a potential low negative significance and no impacts were found to be of high negative significance after application of mitigation measures at this stage. The negative impacts, in particular, will be further assessed during the EIA phase of the project. Potential 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.



1 INTRODUCTION

Harmony Gold Mining Company (hereafter referred to as Harmony), has appointed Environmental Impact Management Services (Pty) Ltd. (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with compiling the necessary reports and undertaking the statutory consultation processes, in support of the proposed expansion of the Kalgold production operation - hereafter referred to as the proposed Kalgold Expansion Project.

Harmony wishes to expand the existing Kalgold production from 130 000 tons per month to 300 000 tons per month. A pre-feasibility study has been undertaken. The findings of the pre-feasibility study have concluded that the following new activities and expansions must be provided for:

- The pit footprint will increase.
- Larger dewatering pipelines (size to be determined after water balance is updated).
- Extension to Spanover waste rock dump.
- Road from the pit to new ROM pad.
- New ROM pad.
- New plant.
- Recommission old TSF at low deposition rate.
- Increase deposition rate at D-zone pit.
- Install pipeline from Central dam to the new plant.
- Install a tailings pipeline from the new plant to old TSF and D-zone pit.
- Pipeline from D-zone to the new plant.
- Pipeline from new plant to stream for discharge of treated water.
- Install two power lines from Ferndale substation to the new plant.
- Install evaporators at Central dam (to evaporate excess water).
- Install a water treatment plant at the new plant.
- Relocate and expand the explosives magazine.
- Additional new road from the plant to the N18.

Kalgold mine is an open pit mining operation located some 60km South West of Mahikeng in the North West Province. The mine is owned and operated by Harmony, who acquired the mine in 1999. The mine is located in the Kraaipan Greenstone Belt, which is part of the large Amalia-Kraaipan Greenstone terrain. The largest ore body is found in the D-Zone, which was mined out by a single pit operation along a strike length of 1 300m and to a depth of approximately 290m below surface. Mining at Kalgold Mine continued at the A-Zone, Windmill and Watertank Open Pits, which are all relatively new opencast operations.

Kalgold has been mining gold for several years and as such holds a number of licenses and authorisations in this regard. The following rights, licenses, authorisations and permits are currently in place and have been considered in the compilation of this report (Table 1).



Table 1: Rights, licenses, authorisations and permits held by Kalgold Mine.

Document	Applicable Properties	Reference Number
Mining Right (dated 09 November 2010)	Portions of portion 2, 3 (portion of portion 1), and the remaining extent of portion 1 of the farm Spanover 284 HN, a certain portion of the farm Spanover 387NH, portion of portion 3 (a portion of portion 1) of the farm Ferndale HN, portions of the farms Goldridge 632 JO (formerly Spanover 287 IO) and Ferndale 554 IO	NW30/5/1/2/2/77 MR
Environmental Management Programme (amended in 2014)	RE of the farm Spanover 552 IO, Spanover 549 IO, Ferndale 554 IO, Goldridge 632 IO	NW/6/2/2/241
S102 Addendum to approved EMPR for new mining areas	Spanover 552 IO, Spanover 549 IO, Ferndale 554 IO, and Goldridge 632 IO	(NW) 30/5/1/2/3/2/1/77 EM
2013 Environmental Authorization (and 2015 amendment of this authorization) for mine optimization project	Portion 0 of farm Spanover 552 IO	NWP/EIA/15/2013
2016 Water Use License for applicable water uses at the mine	Portion 0 of Goldridge 632 IO, Ferndale 554 IO, Ferndale 556 IO, portion 13 of Ferndale 551 IO, RE of Koedoerand 569 IO, Portion 1 and 5 of Spanover 549 IO, Portion 0 of Spanover 552.	07/D41B/ABCGIJ/4754
2019 AEL for various refining processes	Ferndale 554 IO, Goldridge 632 IO, portion 11 of Ferndale 551 IO, Ferndale 564 IO, RE of Koedoerand 569, portion 4 of Spanover 549 IO, portion 5 of Spanover 549, Spanover 552 IO	KALGOLD/AEL/4.17/OCT 2019

Therefore, it is in addition to the authorisations and licenses listed in Table 1, that Harmony wishes to apply for an integrated EA in accordance with the National Environmental Management Act (NEMA) 2014 and National Environmental Management: Waste Act 59 of 2008 for the relevant listed activities associated with the proposed Kalgold Expansion Project.



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 2 below.

Table 2: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(2)(a):	Details of – <ol style="list-style-type: none"> i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae; 	Section 1.2
Appendix 2(2)(b):	The location of the activity. Including – <ol style="list-style-type: none"> i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; 	2
Appendix 2(2)(c):	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – <ol style="list-style-type: none"> i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken; 	Section 2 Appendix B: Maps
Appendix 2(2)(d):	A description of the scope of the proposed activity, including – <ol style="list-style-type: none"> i. All listed and specified activities triggered; ii. A description of the activities to be undertaken, including associated structures and infrastructure; 	Section 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;	Section 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;	Section 5
Appendix 2(2)(g):	<p>A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –</p> <ul style="list-style-type: none"> i. Details of all alternatives considered; ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – <ul style="list-style-type: none"> a. Can be reversed; b. May cause irreplaceable loss or resources; and c. Can be avoided, managed or mitigated; vi. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. The possible mitigation measures that could be applied and level of residual risk; ix. The outcome of the site selection matrix; x. If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. A concluding statement indicating the preferred alternatives, including preferred location of the activity; 	Sections: 6, 7, 8, 9 and 10
Appendix 2(2)(h):	<p>A plan of study for undertaking the environmental impact assessment process to be undertaken, including –</p> <ul style="list-style-type: none"> i. A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; ii. A description of the aspects to be assessed as part of the environmental impact assessment process; 	Section 10



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	<ul style="list-style-type: none"> iii. Aspects to be assessed by specialists; iv. A description of the proposed method of assessing the environmental aspects, including a description of the proposed method assessing the environmental aspects to be assessed by specialists; v. A description of the proposed method of assessing duration and significance; vi. An indication of the stages at which the competent authority will be consulted; vii. Particulars of the public participation process that will be conducted during the environmental impact assessment process; and viii. A description of the tasks that will be undertaken as part of the environmental impact assessment process; ix. Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored; 	
Appendix 2(2)(i)	An undertaking under oath or affirmation by the EAP in relation to – <ul style="list-style-type: none"> i. The correctness of the information provided in the report; ii. The inclusion of comments and inputs from stakeholders and interested and affected parties; and iii. Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; 	Section 13
Appendix 2(2)(j):	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;	Section 13
Appendix 2(2)(k):	Where applicable, any specific information required by the competent authority; and	N/A
Appendix 2(2)(l):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A



1.2 DETAILS OF THE EAP

EIMS has been appointed by Harmony as the Independent EAP and to assist in preparing and submitting the EA application, Scoping and EIA Reports, and undertaking a Public Participation Process (PPP) in support of the proposed Kalgold Expansion Project. The contact details of the EIMS consultant who compiled this Scoping Report are as follows:

- Name of the consultant: Bongani Khupe
- Tel No.: 011 789 7170
- Fax No.: 011 787 3059
- E-mail address: kalgold@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;
- Takes into account 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.

Mr Khupe is an environmental project manager and environmental auditor. He is a registered Professional Natural Scientist who holds a Bachelor of Science Honours degree in Applied Environmental Science from the University of Zimbabwe and is a trained Environmental Auditor (Crystal Clear, 2012). His training included all aspects of Environmental Auditing as well as EMS auditing in terms of ISO14001. In addition, he is a trained on the ISO14001:2015 environmental standard and has completed the EMS lead auditor training in terms of ISO14001:2015. Mr Khupe is registered with the Institute of Environmental Management and Assessment (IEMA) as an Environmental Auditor and with the South African Auditor and Training Certification Authority (SAATCA) as a Provisional Auditor. He has more than 13 years' experience in the environmental field. His key focus is on environmental compliance advice and monitoring, environmental impact assessments, environmental permitting, public participation, environmental management plans and programmes, strategic environmental advice, rehabilitation advice and monitoring as well as providing technical input for projects in the environmental management field. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines.

The Curriculum Vitae of the EAP that is responsible for the compilation of this Report is included in Appendix A.

1.3 SPECIALIST CONSULTANTS

Specialist studies are being undertaken to address the key issues that require further investigation and these include the impact on geohydrology, agricultural potential, terrestrial ecology, freshwater ecology (wetlands), hydrology, heritage, air quality and the social environment. A closure cost assessment and desktop palaeontological study will also be included as part of the specialist studies conducted during the EIA phase. The specialist studies involved the gathering of data relevant to identifying and assessing preliminary environmental



impacts that may occur as a result of the proposed Kalgold Expansion Project. These preliminary impacts were assessed according to pre-defined impact rating methodology (Section 9).

The specialists have also recommended appropriate preliminary mitigation / management or optimisation measures to minimise potential negative impacts or enhance potential benefits, respectively. The specialist reports that informed this scoping level report are included in Appendix D.

Table 3: List of specialists

Study	Specialist
Geohydrological Impact Assessment	MvB Consulting.
Hydrological Impact Assessment	Hydrologic Consulting (Pty) Ltd.
Freshwater Ecology Impact Assessment (Wetlands)	The Biodiversity Company (Pty) Ltd.
Terrestrial Ecology Impact Assessment	The Biodiversity Company (Pty) Ltd.
Hydropedology Impact Assessment	The Biodiversity Company (Pty) Ltd.
Agriculture Potential	The Biodiversity Company (Pty) Ltd.
Heritage and Cultural Resources Impact Assessment	PGS Heritage (Pty) Ltd.
Air Quality Impact Assessment	Airshed Planning Professionals (Pty) Ltd.
Social Impact Assessment	NLN Consulting.
Closure Costing	Environmental Impact Management Services (Pty) Ltd.

In terms of Regulation 16(1)(b)(v) of the NEMA EIA Regulation, 2014, an application for EA must include “the report generated by the national web based environmental screening tool”. The report is attached as Appendix F of this report. Based on the report, the following additional specialist studies were identified:

- Landscape/Visual Impact Assessment.
- Noise Impact Assessment.
- Radioactivity Impact Assessment.
- Traffic Impact Assessment.
- Health Impact Assessment.
- Climate Impact Assessment.
- Seismicity Assessment.

Some of these specialist studies were deemed to not be applicable for the proposed expansion activities. Details which specialist studies have been determined to be not applicable to this project and will not be considered in the EIA phase is included in the Plan of Study for EIA in Section 10 of this report.



2 DESCRIPTION OF THE PROPERTY

Table 4 indicates the farm portions that fall within the proposed Kalgold Expansion Project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 4: Locality details

Farm Name	Remainder of portion 1 and portion 5 of the Farm Spanover 549, the remaining portion of Farm Spanover 552, the Farm Ferndale 554, Portion 13 of the Farm Ferndale 551 and the Remaining extent of the Farm Goldridge 632.		
Application Area (Ha)	The properties that form part of the application area for the proposed Kalgold Expansion Project cover an extent of approximately 2699 hectares (ha).		
Magisterial District	Ngaka Modiri Molema District		
Distance and direction from nearest towns	Kalgold mine is a gold mine located approximately 55km southwest of the town Mafikeng and 60km northeast of the town Stella. The geographic coordinates at the centre of the site is approximately: 26° 8'58.01"S; 25°14'35.97"E.		
21-digit Surveyor General Code for each Portion	Farm Name:	Portion:	21 Digit Surveyor General Code
	Spanover 549	RE of portion 1	TOIO00000000054900001
	Spanover 549	Portion 5	TOIO00000000054900005
	Spanover 552	RE	TOIO00000000055200000
	Ferndale 554	0	TOIO00000000055400000
	Ferndale 551	Portion 13	TOIO00000000055100013
	Goldridge 632	RE	TOIO00000000063200000

Figure 1 and Figure 2 indicate the locality of the existing Kalgold Mine, and the existing Kalgold operations.

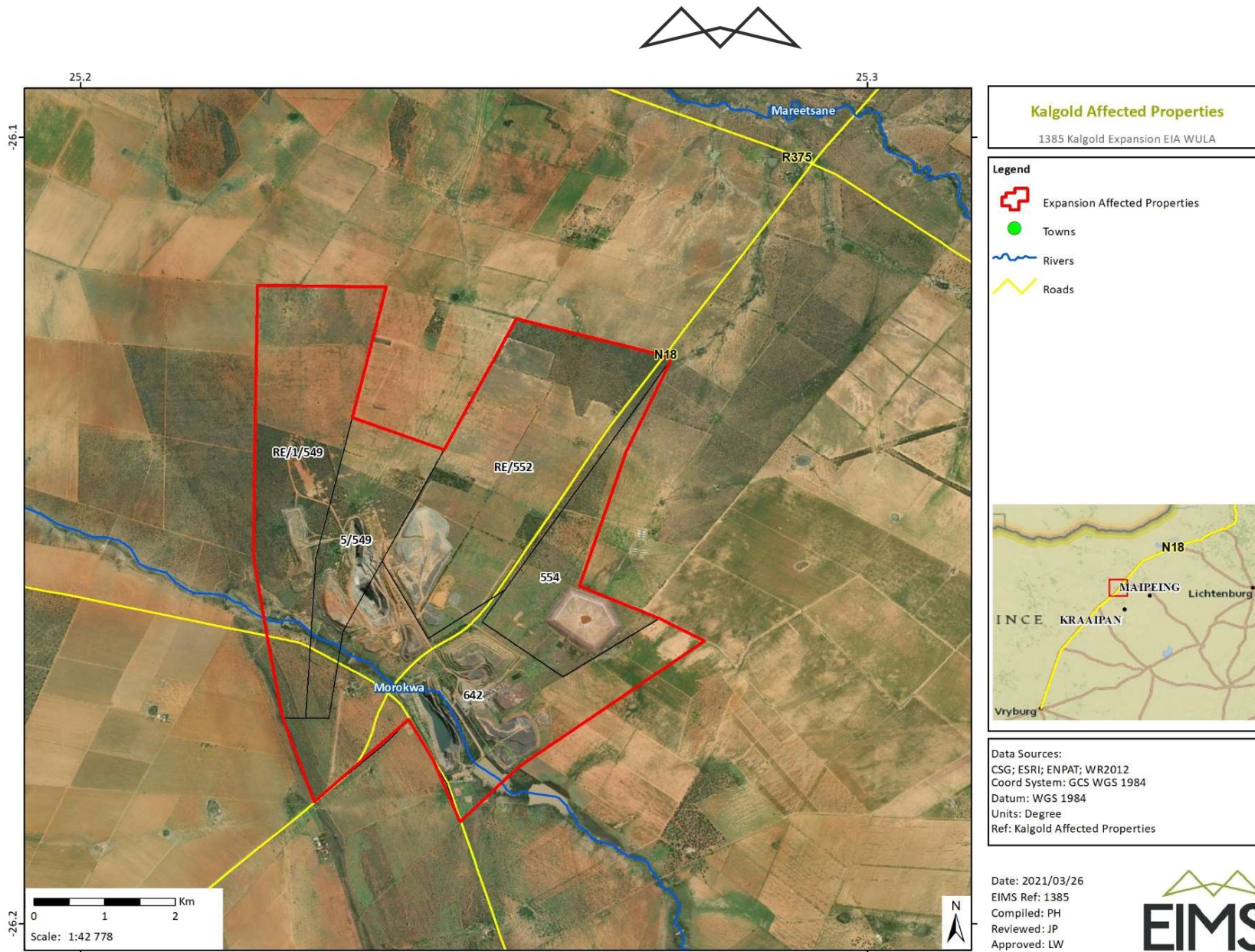
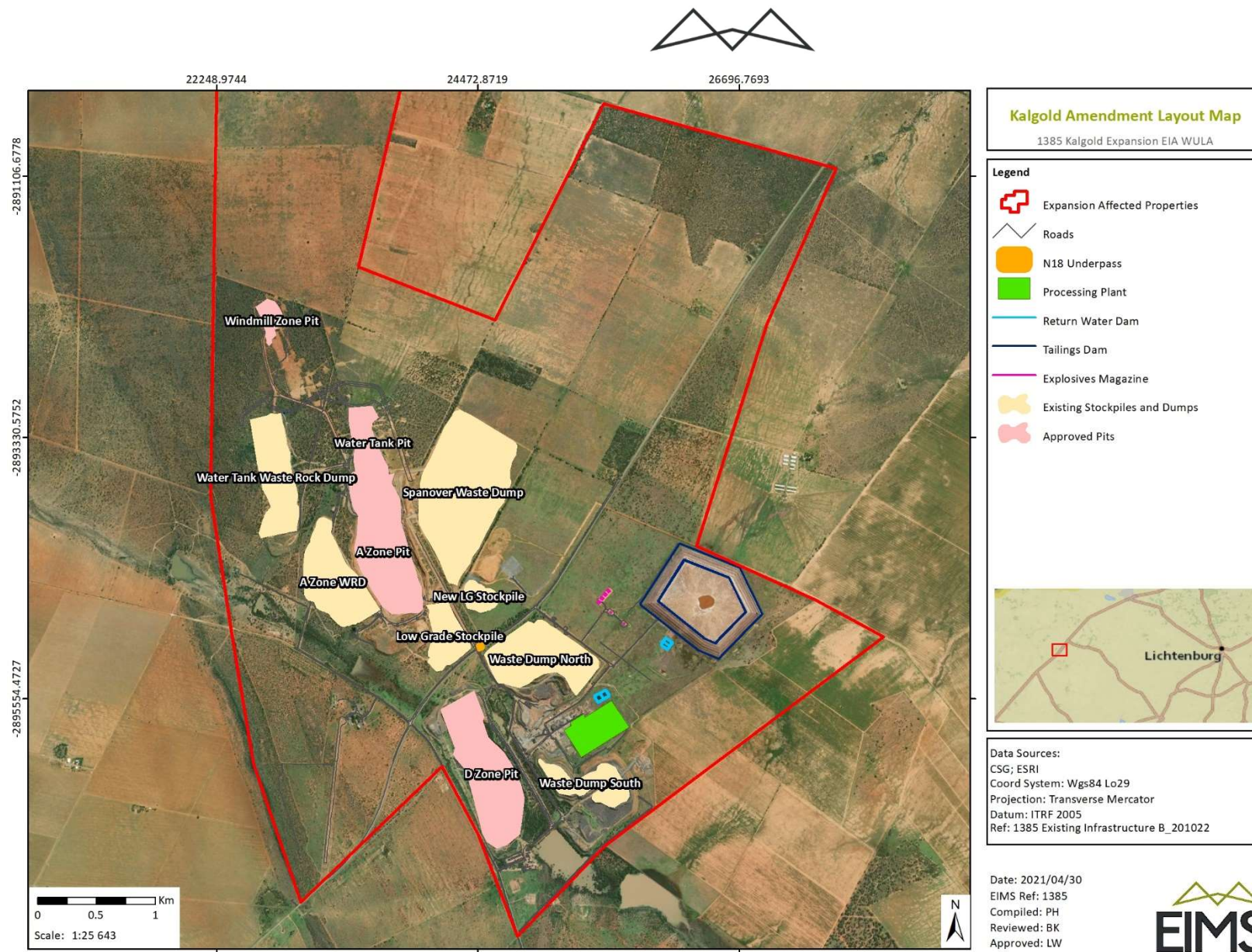


Figure 1: Topographical locality map indicating the existing Kalgold properties and areas potentially affected by the expansion project.





3 DESCRIPTION AND SCOPE OF THE PROPOSED PROJECT

The section below provides a detailed project description for the proposed Kalgold Expansion Project. The aim of the project description is to indicate the activities that are taking place at the current Kalgold operation and the proposed activities to take place for the Kalgold Expansion Project. Furthermore, the detailed project description below is designed to facilitate the understanding of the proposed project related activities which are anticipated to lead to the preliminary impacts identified and assessed in this Scoping Report, and for which management measures have been, or will be designed.

3.1 RESOURCE DETAILS

The Kalgold operation is located within the Kraaipan Greenstone Belt, which forms part of the larger Amalia-Kraaipan Greenstone terrain. The Kraaipan Greenstone Belt consists of north trending linear belts of Archaean metavolcanic and metasedimentary rocks, separated by granitoid units. Mineralisation occurs in shallow dipping quartz veins, which occur in clusters or swarms, within the steeply dipping magnetite-chert banded iron formation. Disseminated sulphide mineralisation, dominated mostly by pyrite, occurs around and between the shallow dipping quartz vein swarms. The following rocks are associated with the ore body:

- The footwall consists of mafic schist and the hanging wall of greywacke, shale, sandstone, conglomerate and siltstone.
- The host rock is Banded Iron Formation (BIF) intercalated with shale. The greenstone formations are exposed in discontinuous outcrops of steeply dipping rocks which define three narrow, sub-parallel belts that strike approximately north-south (GCS, 2008).

The ore body mined at Kalgold occur within the central belt which comprises banded iron formation (BIF), magnetite quartzite, chert, greywacke, shale and schist. The gold mineralization is hosted by steeply dipping BIF that are interbedded with schist, shale and greywacke. The greenstones are hosted within intrusive granite and gneiss. The Kraaipan greenstone is intruded by numerous east-west trending dykes. One such dyke cuts across the southern boundary of the mining lease area. The area is further characterised by abundant faults with displacement from a few metres to hundreds of metres.

3.2 MAIN MINING ACTIONS, ACTIVITIES AND PROCESSES OCCURRING ON SITE

Kalgold Mine first started operation during the mid-1990s where it focussed on mining of the D-Zone ore body. The economic ore body was mined out by a single open pit operation, along a strike length of 1300m and to a depth of approximately 290m below surface. The mining operation at D-Zone open Pit ceased in March 2009. Mining at Kalgold Mine has continued despite the operation cessation at D-Zone Open Pit. The A-Zone Open Pit, Windmill Open Pit and Watertank Open Pit are ongoing opencast operations.

The current opencast pits at Kalgold are therefore:

- The D-Zone pit – the largest ore body, which was mined as a single opencast operation along a strike length of 1300m to a depth of approximately 290m, from 1996 to 2009. Kalgold is currently depositing tailings into the D-Zone pit¹.
- The A-Zone open pit – commissioned in 2005 and also known as Henry's Pit is located immediately south of the Watertank North pit and is approximately 27ha in size.
- The Watertank and Windmill Zone – commissioned in 2008.

The open pit workings are accessed by ramps.

¹ On 16 February 2009 as part of conditions of an EMPr approval, Kalgold was required to backfill all excavations with waste generated from the mine. In the EMPr appendment approval dated 4 May 2019, it was further indicated that no dump structures should be left on the surface (topsoil, overburden, waste rock, tailings and slime dams).



Extensive metallurgical test work conducted by The Council for Mineral Technology (Mintek) and detailed feasibility studies completed in 1995 have shown that the ores at Goldridge are non-refractory and that gold is economically extractable by conventional carbon-in-leach (CIL) technology, yielding high (+91%) recoveries. In addition, the ores in the oxidized portions of the deposits are amenable to gold extraction by the low-cost heap leach method, which recovers between 60 and 70% of the gold. The metallurgical extraction strategy designed for the Goldridge ores, involved the construction of a twin-process plant which incorporates a common batch crushing facility from which the product is fed either to the CIL process (for high grade and sulphidic ores) or the heap leach process (primarily for lower grade oxidised ores). The plant construction programme was designed so that the heap leach plant and pads were constructed first. The heap leach process started producing gold during the third quarter of 1996. Construction of the CIL portion of the plant commenced during May 1997 and the CIL plant came on stream during the first quarter of 1998. At full capacity, the metallurgical complex processes 150 000 tons (90 000 tons CIL, 60 000 tons heap leach) of ore per month yielding approximately 2 500kg (80 000 ounces) of gold per year.

Heap leach and Carbon-in-Leach Heap leach and CIL Heap leaching is an industrial mining process to extract metals and other compounds from ore. Ore from the open pit is trucked to the run of mine (ROM) stockpile area. From here it is transferred via conveyor through pre-primary, primary, secondary, tertiary and quaternary crushing circuits that reduce the ore size from 1000mm to 6mm. This product is stockpiled before lime is added and the material is transported and stacked on the heap leach pads. The cyanide solutions are pumped onto the heaps via a network of drip pipes. These solutions percolate through the ore particles within the heaps. Exposed grains of gold are dissolved and carried in solution via a system of drainage channels at the base of the heap to the pregnant pond. The pregnant pond overflows to an emergency pond in the event of excess solution volumes flowing from the heaps e.g. after a high rainfall event. The pregnant liquor is then pumped through carbon solution columns in which the gold is loaded by absorption onto carbon granules. After gold extraction, the cyanide solutions are pumped to the barren pond, where the cyanide is replenished and the solutions prepared for the next leaching cycle. The loaded carbon is diluted and gold recovered by electro-winning and smelting. The current heap leach facility is no longer operational. Occasionally the heap is loaded into the mills for processing. The historical heap leach and associated dams and ponds are lined with PVC.

The CIL circuit came on stream during March 1998 and shares a batch ore crushing facility with the heap leach operation. This process is used to treat higher-grade oxide and sulphide ores. Ore is taken to the tertiary crusher stage after which 12mm crush will be transferred to the mills where it is reduced to 80% minus 75µm. This pulp is then passed via a gravity concentrator in which the coarse gold is removed for smelting. The gravity tails are transferred to the CIL tanks where cyanide and carbon are added. A series of 6 tanks is in use, the first 2 for gold dissolution only and the following 4 for carbon-in-leach extraction. Loaded carbon from the CIL tanks is transferred to elution columns for gold extraction and electro-winning. Barren ore pulps from the CIL tanks are pumped to the slimes dam for disposal. Storage tanks for the heap leach are: Cyanide: 2 tanks at 29t each; Caustic soda: 1 tank at 29t; and Lime: 120t.

On 16 February 2009 as part of conditions of an EMPr approval, Kalgold was required to backfill all excavations with waste generated from the mine. In the EMPr appendment approval dated 4 May 2019, it was further indicated that no dump structures should be left on the surface (topsoil, overburden, waste rock, tailings and slime dams). The decision was made by Kalgold to utilise tailings for backfilling the pit in line with DMRE conditions, in this regard deposition to the existing TSF was suspended in July 2015. The process of backfilling of the D-Zone open pit with tailings utilises one pipeline with several smaller pipelines, with a total diameter of 269mm, located above ground to transport the tailings slurry from the tailings pump station to the D-Zone open pit. The tailings slurry comprises of 20% tailings and 80% water.

3.3 DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

The existing Harmony Kalgold operation wishes to expand its current production from the current production rate of 130 000 tons per month to 300 000 tons per month. A pre-feasibility study has been undertaken. The findings of the pre-feasibility study have concluded that the following new activities and expansions must be provided for:



- The pit footprint will increase.
- Larger dewatering pipelines (size to be determined after water balance is updated).
- Extension to Spanover waste rock dump.
- Road from the pit to new ROM pad.
- New ROM pad.
- New plant.
- Recommission old TSF at low deposition rate.
- Increase deposition rate at D-zone pit.
- Install pipeline from Central dam to the new plant.
- Install a tailings pipeline from the new plant to old TSF and D-zone pit. (black line in the map indicated. pipelines for both deposition and also another for return water).
- Pipeline from D-zone to the new plant
- Pipeline from new plant to stream for discharge of treated water.
- Install two power lines from Ferndale substation to the new plant. (thick red line).
- Install evaporators at Central dam.
- Install a water treatment plant at the new plant.
- Relocate and expand the explosives magazine.
- Additional new road from the plant to the N18.

A preliminary layout of the proposed infrastructure for the expansion project is presented in Figure 3.

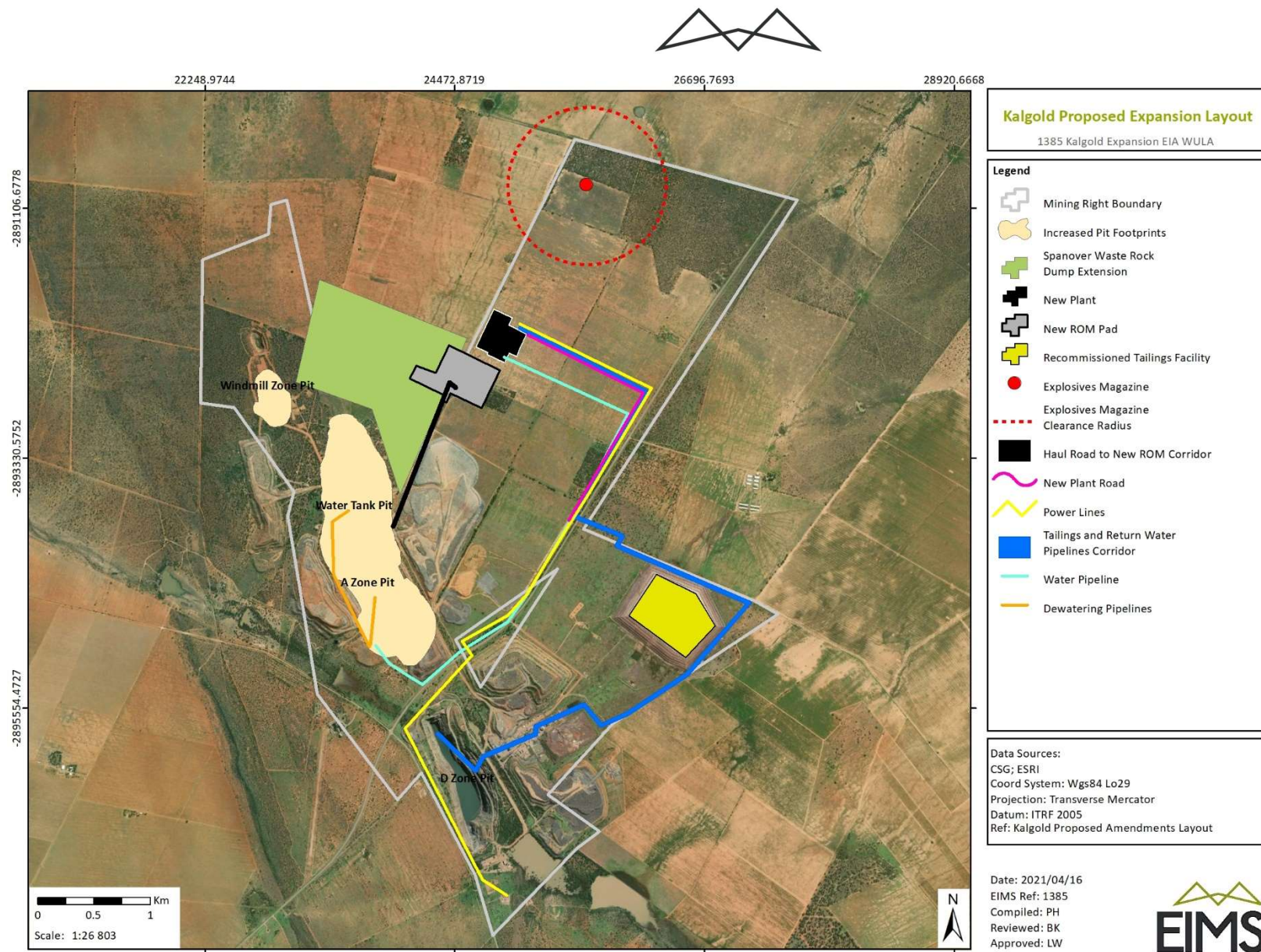


Figure 3: Preliminary layout of the proposed infrastructure for the expansion project



3.4 LISTED AND SPECIFIED ACTIVITIES TRIGGERED

The overall Kalgold Expansion Project requires Environmental Authorization, Waste Management Licence, a Water Use License and an Air Emissions License. The project will also require an amendment of the approved EMPr and MWP through a Section 102 (S102) application. There will also be a requirement to update the Social and Labour Plan. Section below provides list of identified listed and specified activities. The list will also be updated at the EIA phase once more information is available (where required).

3.4.1 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

Table 5 below indicates the Listed activities in terms of the NEMA 2014 EIA Regulations (as amended) that are applicable to the proposed Kalgold Expansion Project. The list will also be updated at the EIA phase where required.



Table 5: Listed activities in terms of the NEMA EIA Regulations (2014) as amended

GNR #	Activity Number	Description of the applicable listed activity	Applicability
GNR 983	9	<p><i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—</i></p> <p><i>(i) with an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more;</i></p> <p><i>excluding where—</i></p> <p><i>(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or</i></p> <p><i>(b) where such development will occur within an urban area.</i></p>	<p>Construction of the following pipelines:</p> <ul style="list-style-type: none"> • Pipeline from central dam to new plant (Internal diameter of approximately 450mm and peak throughput of approximately 230L/s). • Pipeline from D-zone to the new plant) (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s). • Pipeline from new plant to stream for discharge of treated water.
GNR 983	10	<p><i>The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes –</i></p> <p><i>(i) with an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more;</i></p> <p><i>excluding where—</i></p> <p><i>(a) such infrastructure is for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or</i></p> <p><i>(b) where such development will occur within an urban area.</i></p>	<p>Construction of the following pipelines:</p> <ul style="list-style-type: none"> • Dewatering pipelines (Internal diameter of approximately 350mm and peak throughput of approximately 150L/s). • Tailings pipeline from new plant to old TSF and D-zone pit (Internal diameter of approximately 350mm and peak throughput of approximately 160L/s)
GNR 983	12	<p><i>"The development of—</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</i></p>	<p>New pollution control dams</p>



GNR #	Activity Number	Description of the applicable listed activity	Applicability
		<p><i>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</i></p> <p><i>where such development occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</i></p> <p><i>excluding—</i></p> <p><i>(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</i></p> <p><i>(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;</i></p> <p><i>(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;</i></p> <p><i>(dd) where such development occurs within an urban area;</i></p> <p><i>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</i></p> <p><i>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared. "</i></p>	
GNR 983	19	<p><i>"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;</i></p> <p><i>but excluding where such infilling, depositing, dredging, excavation, removal or moving—</i></p>	Expansion of the pits and other associated infrastructure will potentially result in excavation of more than 10 cubic metres of soils and rock from watercourse.



GNR #	Activity Number	Description of the applicable listed activity	Applicability
		<p><i>(a) will occur behind a development setback;</i></p> <p><i>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</i></p> <p><i>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</i></p> <p><i>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</i></p> <p><i>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies."</i></p>	
GNR 983	24	<p><i>"The development of a road—</i></p> <p><i>(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</i></p> <p><i>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</i></p> <p><i>but excluding a road—</i></p> <p><i>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</i></p> <p><i>(b) where the entire road falls within an urban area; or</i></p> <p><i>(c) which is 1 kilometre or shorter."</i></p>	<p>Construction of internal haul roads. The following roads are required:</p> <ul style="list-style-type: none"> • Road from Pit to new ROM pad (approximately 28m wide). • Road from Plant to the N18 (approximately 13m wide).
GNR 983	27	<p>All infrastructure (ventilation shaft)</p> <p><i>"The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p>	<p>Vegetation clearance will be required for the following among others:</p> <ul style="list-style-type: none"> • Pit expansion. • Extension of spanover waste rock dump. • New ROM Pad.



GNR #	Activity Number	Description of the applicable listed activity	Applicability
		<i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.”</i>	<ul style="list-style-type: none"> • Explosives magazine. • Linear infrastructure
GNR 983	45	<p><i>The expansion of infrastructure for the bulk transportation of water or storm water where the existing infrastructure—</i></p> <p><i>(i) has an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) has a peak throughput of 120 litres per second or more; and</i></p> <p><i>(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or</i></p> <p><i>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</i></p> <p><i>excluding where such expansion—</i></p> <p><i>(aa) relates to transportation of water or storm water within a road reserve or railway line reserve; or</i></p> <p><i>(bb) will occur within an urban area.</i></p>	Expansion of existing pipelines
GNR 983	46	<p><i>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></p> <p><i>(i) has an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) has a peak throughput of 120 litres per second or more; and</i></p> <p><i>(a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or</i></p> <p><i>(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more;</i></p> <p><i>excluding where such expansion—</i></p>	Expansion of existing pipelines.



GNR #	Activity Number	Description of the applicable listed activity	Applicability
		<p><i>(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</i></p> <p><i>(bb) will occur within an urban area.</i></p>	
GNR 983	56	<p><i>"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-</i></p> <p><i>(i) where the existing reserve is wider than 13,5 meters; or</i></p> <p><i>(ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas."</i></p>	Upgrade to existing roads.
GNR 984	4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres	Development of storage facilities for chemicals required in the new processing plant.
GNR 984	6	<p><i>"The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding–</i></p> <p><i>(i) activities which are identified and included in Listing Notice 1 of 2014;</i></p> <p><i>(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;</i></p> <p><i>(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or</i></p>	Construction and operation the processing plant will require an Atmospheric Emissions Licence (AEL).



GNR #	Activity Number	Description of the applicable listed activity	Applicability
		<i>(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day. "</i>	
GNR 984	15	<p><i>"The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</i></p> <p><i>(i) the undertaking of a linear activity; or</i></p> <p><i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan."</i></p>	<p>Vegetation clearance will be required for the following among others:</p> <ul style="list-style-type: none"> • Pit expansion. • Extension of spanover waste rock dump. • New ROM Pad. • Explosives magazine. • Linear infrastructure. • New Processing Plant.
GN 984	17	<p><i>"Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including—</i></p> <p><i>(a) associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource; or</i></p> <p><i>(b) the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening or washing;</i></p> <p><i>but excluding the secondary processing of a mineral resource, including the smelting, beneficiation, reduction, refining, calcining or gasification of the mineral resource in which case activity 6 in this Notice applies.</i></p>	<p>Mining activities including the proposed additional infrastructure required.</p>
GNR 985	4	<i>The development of a road wider than 4 meters with a reserve less than 13.5 meters.</i>	Construction of roads



GNR #	Activity Number	Description of the applicable listed activity	Applicability
GNR 985	10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres	Storage of hazardous chemicals withing the processing plant.
GNR 985	12	<p><i>The clearance of an area of 300 square meters or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p><i>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004</i></p>	<p>The construction of the powerline, tailings pipeline, roads and return water pipelines.</p> <p>The Power line, water pipeline, roads and return water corridor falls across the ESA1 areas. The status of these classifications will be confirmed during the field assessment.</p>
GNR 985	14	<p><i>The development of—</i></p> <p><i>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or</i></p> <p><i>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</i></p> <p><i>(a) within a watercourse;</i></p> <p><i>(b) in front of a development setback; or</i></p> <p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</i></p> <p><i>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</i></p>	Construction of pollution control dams.
GNR 985	18	<i>The widening of a road by more than 4 meters; or the lengthening of a road by more than 1 kilometre.</i>	Construction or widening of haul roads.



3.4.2 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

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 detailed in Table 6 below. Listed activities will be review and updated during the EIA phase where applicable.

Table 6: Waste management activities applicable to the expansion project

NEMWA_GNR921 Activity	Description of Applicable Listed Activity	Applicability
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).	Extension of Spanover waste rock dump and recommissioning of the existing Tailings Storage Facility.
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).	Extension of Spanover waste rock dump and recommissioning of the existing Tailings Storage Facility.

3.4.3 THE NATIONAL WATER ACT (NWA)

An application for a Water Use Licence (WUL) will be lodged with the Department of Human Settlements, Water and Sanitation (DHSWS) for the water uses triggered by the expansion project. The water use licence will be based on the final project layout that will be available during the EIA phase. More details on anticipated water uses will be provided during the EIA phase.

3.4.4 THE NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (NEM:AQA)

In terms of the NEM:AQA, no person may conduct an activity listed on the national list anywhere in the Republic or listed on a list applicable in a province anywhere in that province without a Provisional Atmospheric Emission Licence (PAEL) or an AEL. The Kalgold operations has an existing full AEL (no. NWPG/ KALGOLD/AEL 4.17 /OCT 2019) in respect of the listed activity category 4, subcategory 4.17; of the Section 21 to NEM:AQA. The AEL was issued based on the information provided in the application dated 04 September 2019 and is valid for a period of five (5) years from 14 October 2019.

A separate AEL will be required for the new processing plant. Based on information available the new processing plant will trigger the following listed activities under Section 21 of the NEM:AQA:

- Subcategory 4.1: Drying and calcining of mineral solids including ore.
- Subcategory 4.17: The production or processing of precious and associated base metals through chemical treatment.

Listed activities will be reviewed and updated during the EIA phase where applicable.



4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. A summary of the applicable legislation is provided in Table 7 below. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the DMRE, in accordance with the requirements of both the NEMA and MPRDA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed activity. More detail on the legislative framework is presented below.

Table 7: Applicable legislation and guidelines overview

Applicable Legislation and Guidelines	Applicability to Project
<p>(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).</p>	
<p>APPLICABLE LEGISLATION</p>	
<p><u>Constitution of the Republic of South Africa (Act 108 of 1996):</u> 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 -</p> <ul style="list-style-type: none"> 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 c) generations, through reasonable legislative and other measures that: <ul style="list-style-type: none"> 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” <p>Therefore, the EIA is conducted to fulfil the requirement of the Bill of Rights.</p>	<p>The EIA and associated impact mitigation actions are conducted to fulfil the requirement of the Bill of Rights.</p>
<p><u>National Environmental Management Act (Act 107 of 1998 – NEMA); and the EIA Regulations (2014, as amended):</u> The NEMA (1998) requires that a project of this nature (inclusive of a Mining Right) must undergo a Scoping and Environmental Impact</p>	<p>The proposed project triggers various NEMA Listed Activities. An integrated Environmental</p>



Applicable Legislation and Guidelines	Applicability to Project
<p>Assessment (EIA); an Environmental Management Programme (EMPr) must also be compiled. Regulations applicable to this project include the following:</p> <ul style="list-style-type: none"> • EIA Regulations GN R. 982 (2014, as amended) in terms of the NEMA; • EIA Regulations GN R. 983 (2014, as amended) in terms of the NEMA; • EIA Regulations GN R. 984 (2014, as amended) in terms of the NEMA; and • EIA Regulations GN R. 985 (2014, as amended) in terms of the NEMA. 	<p>authorisation is being applied for.</p>
<p><u>Minerals and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA) as amended; and the Mineral and Petroleum Resources Development Regulations (2004, as amended):</u></p> <p>The MPRDA (2002) requires an applicant who wishes to proceed with a mining project to obtain a Mining Right, part of which requires the applicant to obtain Environmental Authorisation in terms of the NEMA.</p>	<p>Kalgold has an approved Mining Right and Environmental Management Programme (EMPR) in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the Kalgold Mine.</p>
<p><u>National Water Act (Act 36 of 1998 – NWA):</u></p> <p>The NWA recognises that water is a scarce and unevenly distributed national resource which must be managed encompassing all aspects of water resources.</p> <p>In terms of Chapter 4 of the NWA, activities and processes associated with the proposed Kalgold Expansion Project and associated infrastructure, are required to be licensed by the Human Settlements, Water and Sanitation (DHSWS). An Integrated Water Use Licence Application (IWULA) has been lodged with the DHSWS in terms of Section 21 of the NWA and is currently in process. It is anticipated that the following water uses require authorisation</p> <ul style="list-style-type: none"> • Section 21 (a); • Section 21(c); • Section 21(i); • Section 21 (g); and • Section 21 (j). <p>Furthermore, the Integrated Water and Waste Management Plan (IWWMP) will be amended. This is being compiled and will be submitted in</p>	<p>An amendment of the current WUL will be required for the new water volumes required as well as the tailings to be deposited. In addition, some infrastructure might be close to or require to cross watercourses.</p>



Applicable Legislation and Guidelines	Applicability to Project
<p>support of the IWULA after being made available to the public for comment.</p>	
<p><u>National Heritage Resources Act (Act 25 of 1999 – NHRA):</u></p> <p>The NHRA established the South African Heritage Resources Agency (SAHRA) in 1999. SAHRA is tasked with protecting heritage resources of national significance. Section 34 and 38 of the NHRA details specific activities that require a Heritage Impact Assessment (HIA) that will need to be approved by SAHRA, principally:</p> <ul style="list-style-type: none"> • Section 34(1): Structures older than 60 years may not be altered or demolished prior to permission from SAHRA • Section 38(1a): The construction of a road, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length • Section 38(1c): Any development or other activity which will change the character of a site (i) exceeding 5000m² in extent, or (ii) involving three or more erven or subdivisions <p>Furthermore, Section 48(2) requires a permit from a heritage resources authority to perform these activities. Conditions and restrictions may be specified in the permit and the proposed project triggers activities that require approval from SAHRA.</p>	<p>Heritage and Palaeontology specialist studies, the environmental Scoping and Impact Assessment Reports, and the EMPr.</p>
<p><u>Specific Environmental Management Acts (SEMAs):</u></p> <p>The SEMAs refer to specific portions of the environment where additional legislation over and above the NEMA (1998) as amended, is applicable. SEMAs likely to be relevant to this application include the following:</p> <ul style="list-style-type: none"> • National Environmental Management: Biodiversity Act (Act 10 of 2004); • National Environmental Management: Air Quality Act (Act 39 of 2004); and • National Environmental Management: Waste Act (Act 59 of 2008). <p>SEMAs likely to be applicable in this regard (if any) include the Threatened Or Protected Species (TOPS) permit for the removal of any protected tree species from site, and Waste Management related licencing or registration.</p>	<p>An application for a Waste Management Licence (WML) is being applied for in terms of Categories B7, B10 and B11 (construction of a facility for the disposal of hazardous waste – discard / residue deposit).</p>



Applicable Legislation and Guidelines	Applicability to Project
APPLICABLE GUIDELINES	
<p><u>Integrated Environmental Management Information Guidelines Series:</u></p> <p>This series of guidelines was published by the Department of Environment, Forestry and Fisheries (DEFF), and refers to various environmental aspects. Applicable guidelines in the series for the Kalgold Expansion Project include:</p> <ul style="list-style-type: none"> • Guideline 5: Companion to NEMA EIA Regulations, 2010; • Guideline 7: Public participation; and • Guideline 9: Need and desirability. <p>Additional guidelines published in terms of the NEMA EIA Regulations, 2014 (as amended), in particular:</p> <ul style="list-style-type: none"> • 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. 	<p>The guidelines will be used throughout the environmental Scoping and Impact Assessment process.</p>
<p><u>Best Practise Guideline (BPG) Series:</u></p> <p>The BPG series refers to publications by the then Department of Water Affairs and Forestry (now Human Settlements, Water and Sanitation – DHSWS) providing best practice principles and guidelines relevant to certain aspects of water management. Best practice guidelines relevant to the proposed Kalgold Expansion Project include the following:</p> <ul style="list-style-type: none"> • BPG A4: Pollution Control Dams; • BPG H1: Integrated Mine Water Management; • BPG H2: Pollution Prevention and Minimisation of Impacts; • BPG H3: Water Reuse and Reclamation; • BPG H4: Water treatment; • BPG G1: Storm Water Management; • BPG G2: Water and Salt balances; • BPG G3: Water Monitoring Systems; and • BPG G4: Impact Prediction. 	<p>Surface water and groundwater specialist studies, as well as the environmental Scoping and Impact Assessment process.</p>
<p><u>Global Industry Standard on Tailings Management</u></p> <p>The Global Industry Standard on Tailings Management, which is the outcome of the Global Tailings Review process, is an important milestone</p>	<p>The guidelines will be considered where applicable during the environmental</p>



Applicable Legislation and Guidelines	Applicability to Project
<p>towards the ambition of zero harm to people and the environment from tailings facilities.</p> <p>Underpinned by an integrated approach to tailings management, the Standard aims to prevent catastrophic failure and enhance the safety of mine tailings facilities across the globe. It goes beyond existing guidance on the management of tailing facilities addressing crucial issues including:</p> <ul style="list-style-type: none"> • meaningful engagement of project affected people throughout the lifecycle of the mine tailing facility; • raising the bar on human rights related requirements; • strengthening of environmental protection requirements, including stronger attention to the evolving climate change impacts on mine tailing facilities and to restoration; • application of a structured and robust approach to the risk classification of existing and planned facilities; • establishing a governance mechanism for the management of tailing facilities, as well as identifying high level responsibility for the implementation of the standard, in direct communication with the Board; • public disclosure and transparency of information on mine tailing facilities to stakeholders. 	<p>Scoping and Impact Assessment process.</p>

4.1 APPLICABLE NATIONAL LEGISLATION

The legal framework within which the proposed Kalgold Expansion Project operates is governed by many Acts, Regulations, Standards and Guidelines on an international, national, provincial and local level. Legislation applicable to the project includes (but is not limited to) 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. In the event that the proposed activities require material (e.g. sand, gravel, aggregate) for the purposes of construction then the provisions of the MPRDA may apply.

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 amended in April 2017. This Scoping Report pertains to an EA application for the proposed Kalgold Expansion Project. A Section 102 application, for the amendment of the MWP and approved EMPr to include the activities pertaining to the proposed Kalgold Expansion Project, will be completed in due course.

In support of the EA application submitted for the Kalgold Expansion Project, 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.



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. 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 DEFF) 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 those proposed for the proposed Kalgold Expansion Project, officially became governable under the NEMA EIA Regulations (as amended) in December 2014 with the competent authority identified as the DMRE.

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 have been identified to be triggered by the proposed development/ mining activity. The purpose of these procedures is to provide the competent authority with adequate information to make 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. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity.

The Regulations differentiate between a simpler Basic Assessment Process (required for activities listed in GN R. 983 and GN R. 985) and a more complete EIA process (activities listed in GN R. 984). In the case of the Kalgold Expansion Project, there are activities triggered under GN R. 984 and as such a full EIA process is necessary. Figure 4 below provides a graphic representation of all the components of a full EIA process.

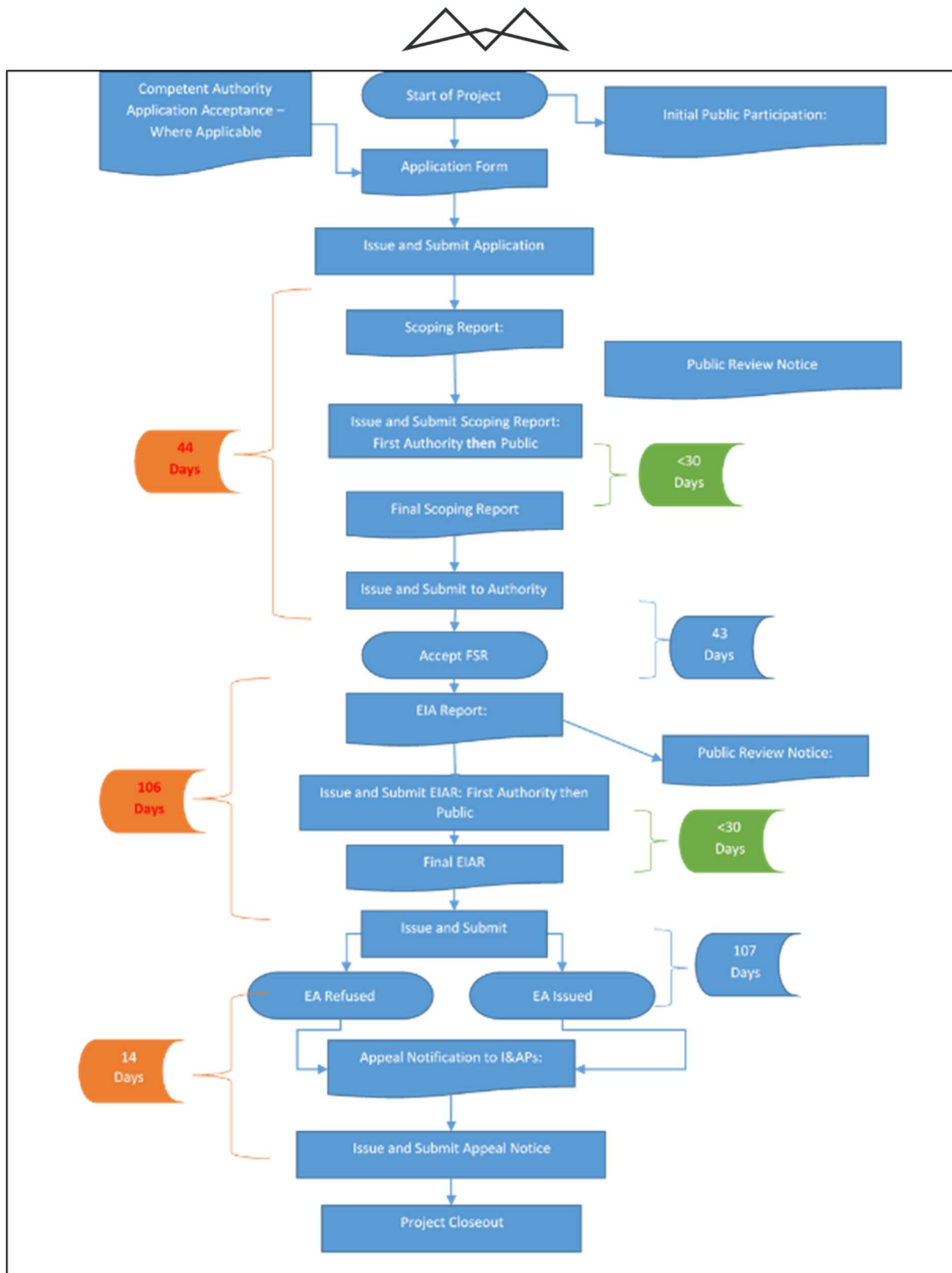


Figure 4: EIA process diagram

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. The financial provision costs in line with DMRE guidelines will be presented in the EIA.



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 5.

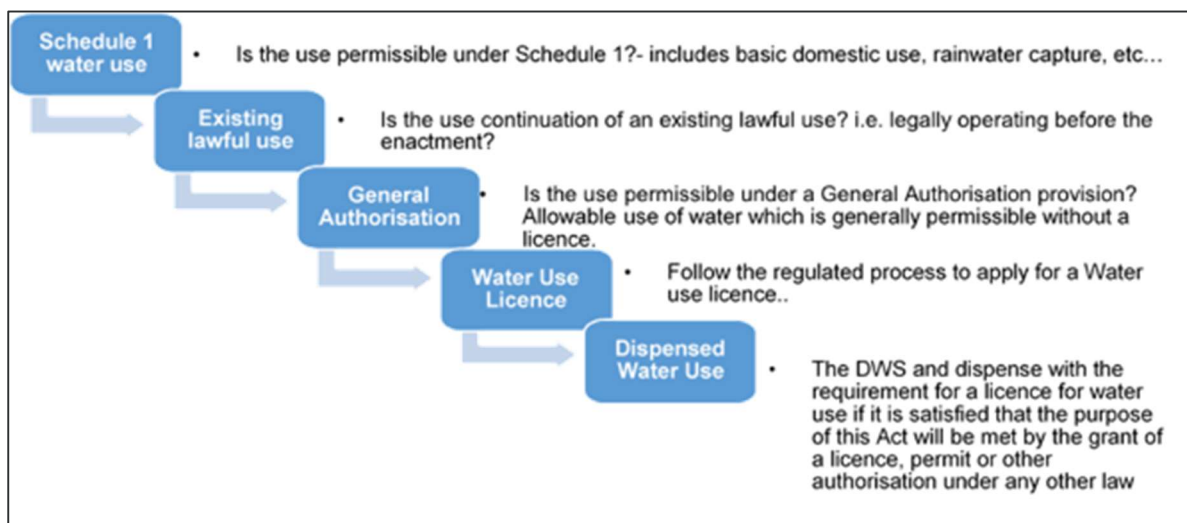


Figure 5: Authorisation processes for new water uses

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the Human Settlements, Water and Sanitation (DHSWS). Water users are required to register certain water uses that actually took place on the date of registration, irrespective of whether the use was lawful or not. 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.

Harmony was granted an Integrated Water Use Licence (IWUL) in September 2016 (Water Use Licence 07/D41B/ABCGIJ/4754) for the following water uses:

- Section 21(a): Taking of water from a water resource (groundwater abstraction borehole and opencast workings);
- Section 21 (b): Storage of water (pressed steel tank for domestic use)
- Section 21 (c): Impeding or diverting the flow of water in a watercourse (upgrading of road crossing over a wetland and infrastructure with 500 m for the wetland);
- Section 21 (g): Disposing of waste in a manner which may detrimentally impact on a water resource (sewage treatment facility, pollution control dam, dirty water from stockpile areas and discard facility);
- Section 21 (i): Altering the bed, banks, course or characteristics of a watercourse (upgrading of road crossing over a wetland and infrastructure with 500 m for the wetland); and
- Section 21 (j): Removing, discharging or disposing of water found underground (dewatering from the opencast workings).

On 16 February 2009 as part of conditions of an EMPr approval, Kalgold was issued a directive from the DMRE to backfill all excavations with waste generated from the mine. In the EMPr appendment approval dated 4 May 2019 Kalgold was further directed that no dump structures should be left on the surface (topsoil, overburden, waste rock, tailings and slime dams). In response to this directive and also motivated by the fact that the existing tailings dam had limited capacity, Kalgold subsequently decided to backfill the D-zone pit utilising tailings from the mining process. An Integrated Water and Waste Management Plan has been compiled for this project, dated October 2014. The water use licence will need to be amended to include the new water uses associated with the expansion project.

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 principle 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.

These conditions above restrict the proposed Kalgold Expansion Project opencast mining pit extension from being located within the 1:50 floodline, should the proposed location be less than 100m from the floodline then a minimum watercourse buffer distance of 100 metres from said infrastructure and activities must be implemented. Furthermore, the clean and dirty water areas within the project are to be kept separate and the relevant infrastructure such as the proposed dirty water channels and sump at the stockpile dump areas and the pit must be designed, constructed, maintained and operated to ensure conveyance of the 1:50 year peak flow. Pollution of water resources in the vicinity of the project area is to be prevented and mitigated against. Moreover, should any material be removed from the surrounding watercourses during the construction and operation of the proposed Kalgold Expansion Project, mitigation measures to prevent instability, erosion, sedimentation, alteration and pollution of the watercourse.

4.1.5 CATCHMENT MANAGEMENT STRATEGIES

The country has been divided into nineteen Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level will be achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA will progressively develop 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 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 Kalgold Mine is situated in the Lower Vaal Water Management Area (WMA 5) within the Orange River primary catchment and the quaternary catchment D41B. The Morokwa River runs through the middle of the Kalgold Mine flowing in a north-westerly direction towards the Koedoespruit River. Other rivers that drain quaternary catchment D41B are the Mareetsane, Setlagole, Madibeng and Thuthwane Rivers, all flowing in a north-westerly direction.

Groundwater resources are of major importance in the Lower Vaal WMA, supporting the dispersed rural communities and urban centres. Therefore, the management of the groundwater resources is of utmost importance in this subcatchment. The natural occurring water quality in the WMA is generally good in the dolomitic/karstic and fractured/crystalline aquifers. In the western portion of the WMA in the Kalahari group primary (sand/gravel) aquifers and clay formations the quality is often naturally poor with TDS values ranging from 1500 mg/l and higher. Water to the western parts of the WMA are therefore supplied from the Vaal River system.

The Vaal River and its tributaries are generally accepted as “workhorse” rivers to support the water requirements of the hub of South Africa’s economy. As indicated in the Vaal Overarching ISP report, the Vaal River Catchment has sub-catchments whose natural flow and water quality regimes are significantly changed from natural conditions, whilst others are close to natural. The impacted river systems in the Vaal River catchment are highly regulated by major and small dams. The natural flow patterns in many of these river reaches have been substantially modified by return flows from wastewater treatment plants, mine dewatering, agricultural return flows and releases of water from transfer schemes into the river systems.

In terms of the ecological reserve, the economic activities supported by the water resources in the Vaal River System are recognised as the economic engine of South Africa and the Vaal River is considered to be a “work



horse” river. However, the ecology of the river should be managed to prevent further degradation and improve areas where unacceptable ecological conditions exist without causing a significant reduction in the water availability.

Agriculture plays a major role in terms of economic development in the WMA. Almost every farm unit in the WMA is dependent on groundwater for domestic use and stock watering. There are however limited abstraction volumes available but in terms of quantities of water, stock farming has a relatively small influence on the regional groundwater resource. There are several mining operations in this WMA. These activities vary from base-metal mining; diamond mining and even limited gold mining in the Kalahari greenstone belt. Groundwater use at most of these sites is limited and should any seepage occur into opencast pits or underground workings, the water is usually pumped and utilized in processes to minimize use of other water sources. This pumping often causes localized dewatering.

The proposed Kalgold Expansion Project is submitting 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 EMP to be implemented for this project.

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

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

- Hazardous waste: means *“any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.”*
- Residue deposits: means *“any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right.”*



- Residue stockpile: means “any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act.”
- General waste: means “waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69.”

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. The proposed expansion project triggers 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.”

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

These regulations pertaining 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 Kalgold Expansion 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 generated from the Kalgold Expansion Project will need to be classified and managed in accordance with the provisions of the Act, unless part of the waste listed as not requiring classification (Annexure 1 of these Regulations). 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 waste generated from the proposed Kalgold Expansion Project will be classified with this Regulation, if not exempt by Annexure 1. The classified waste must then be assessed in accordance with the National Norms and Standards for the Assessment of Waste for Landfill Disposal (GN R. 635 of 2013) to determine its waste type, prior to disposal in terms of the Disposal of Waste to Landfill Regulations set in terms of section 7 (1) of the Act.

Moreover, Chapter 9 of this Regulation stipulates the requirements for motivation and consideration of listed Waste Management Activities that do not require a WML. The motivation must:

- Demonstrate that the waste management activity can be implemented without unacceptable impacts on, or risk to, the environment or health;
- Must provide a description of the waste;
- Description of waste minimisation or waste management plans; and
- Description of potential impacts, etc.

The transitional provisions under Chapter 6 of this Regulation prescribes timeframes in which all waste must be classified within 18 months from the date of commencement of these Regulations (23 August 2013). Waste streams generated from the proposed Kalgold Expansion Project activities and not listed under Annexure 1 of this Regulation, mainly the waste rock, will be classified accordingly to SANS 10234 and subsequently managed and disposed or stored in accordance with the relevant legislative requirements.

4.1.8 NEMWA NATIONAL NORMS AND STANDARDS FOR THE ASSESSMENT OF WASTE FOR LANDFILL DISPOSAL, 2013 (GN R. 635)

These Norms and Standards prescribe the requirements for the assessment of waste prior to storage or disposal to landfill. The aim of the waste assessment tests is to characterise the material to be deposited or stored in terms of the above-mentioned waste assessment guidelines set by the DEFF. The waste generated at the proposed Kalgold Expansion Project and not listed under Annexure 1 of the Waste Classification and Management Regulations, must be assessed in accordance to these Norms and Standards to determine the waste type. In terms of Regulation 12(1) of GN R 634 with regards to the classification of waste, the potential level of risk associated with disposal or downstream use of waste must be determined by following the prescribed and appropriate analysis protocol as detailed in these Norms and Standards. The assessment of the waste from the Kalgold Expansion Project will:

- Identify the chemical substances present in the waste;
- Sampling and analysis to determine the total concentration (TC) and leachable concentration (LC) of the elements and chemical substances that have been identified within the waste according to section 6 of this regulation;
- Based on the TC and LC limits of the identified elements and chemical substances in the analysed waste exceeding the corresponding TC and LC thresholds respectively, the waste type will be determined (Type 0 Waste to Type 4 Waste); and



- The waste type will then be used determine to which landfill class site the waste must be disposed and / or the suitable containment barrier design for storage.

4.1.9 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.

4.1.10 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). The proposed expansion project will trigger some of these listed activities.

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. All mines are required to account for the amount of pollutants discharged into the atmosphere (total emissions for one or more specific GHG pollutants) by 31 March each year.



The Carbon Tax Policy Paper (CTPP) (Department of National Treasury, 2013) stated consideration will be given to sectors where the potential for emissions reduction is limited. Certain production processes indicated in Annexure A of the notice (Government Gazette No. 40996 dated 21 July 2017) with GHG in excess of 0.1 Mt, measured as CO₂-eq, are required to submit a pollution prevention plan to the Minister for approval.

4.1.11 NATIONAL DUST CONTROL REGULATIONS

Dust fall 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 dust fall 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 dust fall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust will be created from the proposed Kalgold Expansion Project 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, 2008b).

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, 2008b).

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 THE NATIONAL FORESTS ACT (NFA)

According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that “*no person may cut, damage, disturb, destroy or remove any protected*



tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.”

The exact number of protected species on the proposed Kalgold Expansion Project area is not known at this stage however a terrestrial ecology impact study will be conducted for the EIA phase of the project to verify findings of this Scoping Report as well as to assess in more detail the impacts identified to date.

4.1.14 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA) – ALIEN AND INVASIVE SPECIES LIST

This Act is applicable since it 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.

4.1.15 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.

4.1.16 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT

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 Kalgold Expansion Project, and preliminary mitigation and management measures recommended. These will be updated during the EIA phase of this project and will include input from the detailed impact assessment studies by the various specialists, the EAP, commenting authorities and any related comments from I&APs.

4.1.17 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.

4.1.18 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.

4.1.19 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

4.1.20 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.



5 NEED AND DESIRABILITY OF THE PROPOSED PROJECT

The Kalgold Expansion Project will allow the Kalgold mine to increase its gold production capacity. There are also several socio-economic benefits associated with the expansion project. If the project were not to proceed, the additional economic activity, skills development and available jobs would not be created or sustained.

The Kalgold mine is an existing mine and the expansion project will only increase the production and associated tonnage output at the mine. The proposed Kalgold Expansion Project will allow the applicant to increase production at the current mine.

The needs and desirability analysis component of the *“Guideline on need and desirability in terms of the Environmental Impact 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, loss of heritage sites, opportunity costs, etc.). Table 8 below presents the needs and desirability analysis undertaken for the Kalgold Expansion Project.



Table 8: Needs and desirability analysis for the Kalgold Expansion Project

Ref No.	Question	Answer
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	<p>The following specialist studies are being conducted for the proposed Kalgold Expansion Project:</p> <ul style="list-style-type: none"> • Air quality; • Terrestrial Ecology; • Heritage; • Social; • Freshwater Ecology (Wetlands); • Agriculture Potential, Soils and Land capability; • Hydrology; • Hydropedology; and • Geohydrology. <p>The conclusions of these studies, and the identified preliminary impacts and associated mitigation measures will be further assessed in the EIA phase and the results thereof included in the EIA Report and accompanying EMPr.</p> <p>The potential benefits and motivation for the Kalgold Expansion project is presented in this section of the report.</p>
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. Efforts will be made to avoid disturbance to sensitive biodiversity. These sections will be further expanded on in the EIA Report and EMPr.
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?	Refer to the alternatives considered for this project in Section 6, the baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. These sections will be further expanded on in the EIA Report and EMPr.



Ref No.	Question	Answer
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?	Refer to Section 3
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?	In addition to the baseline heritage and palaeontological findings presented in Section 8 of this Scoping Report as well as the associated specialist Heritage Scoping Report in Appendix D, a Phase 1 Heritage impact assessment and a palaeontological study will be undertaken in the EIA phase and the findings thereof presented in the EIA Report and EMPr.
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?	<p>Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report.</p> <p>It is noted that due to the nature of this project (mining of gold), a non-renewable resource will be depleted. Gold mining does however contribute significantly to the country's economy and therefore at the current stage mining of gold is still needed within South Africa.</p> <p>Preliminary impacts from the proposed project have been identified and mitigation measures aimed at avoiding, reducing and / or managing the negative impacts as well as enhancing the positive impacts have been recommended (Section 9).</p>
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 identified impacts, their assessment and recommended mitigation measures in Section of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.



Ref No.	Question	Answer
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	The proposed Kalgold Expansion Project will rely on / depend on the extraction of a mineral resource.
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 Kalgold mine is already existing. Refer to Section 6 for the alternatives considered in this Scoping Report. These will be expanded on in the EIA Report.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The Kalgold mine is already an existing mine and the proposed project will be an expansion of the existing mine utilising infrastructure.
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)?	In terms of the ecological impacts, the current limitations were cited by the specialist: <ul style="list-style-type: none"> The ecological assessment represents the Scoping phase of the project only. After further field surveys a final biodiversity baseline and impact assessment report will be submitted.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk is low as previous specialist studies have been conducted in the areas surrounding the proposed project location, and therefore some information is already available.
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?	Sufficient information was gathered prior to the onset of this process to indicate that the potential mining of additional gold is feasible. In addition, it is noted that this project extends a current mining operation.
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?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.



Ref No.	Question	Answer
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?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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.)?	Refer to baseline ecological information in Section 8, and the impact assessment and mitigation measures in Section 9 of this Scoping Report. These sections will be further expanded in the EIA Report and EMPr.
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?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 6 for details of the alternatives considered, as well as this section of the Scoping Report for the advantages and disadvantages of the proposed activity. This aspect will be further expanded on in the EIA Report.
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 the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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,	It is indicated in the Social Scoping Report (refer to Appendix D) that according to the NMMDM IDP (2018/19), mining and quarrying was the biggest contributor the district's economy with a contribution of close on R47 million to the district's economy in the 2015/16 financial year.



Ref No.	Question	Answer
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.),	<p>The mine will make use of labourers from the local community as far as possible. According to the RLM's Spatial Development Plan (SDF) (in the RLM IDP, 2016), most people in the municipal area live in rural villages characterised by low economic activity forcing people into subsistence livelihoods. Places of employment are generally far from villages and therefore tend to be inaccessible.</p> <p>Agriculture is the predominant sector in the Ratlou local economy. The project area is within the area currently characterised by both agriculture and mining activities. According to the NMMDM IDP (2018/19), mining and quarrying was the biggest contributor the district's economy with a contribution of close on R47 million to the district's economy in the 2015/16 financial year.</p>
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 Scoping Report. This section will be expanded on in the EIA Report and EMPr.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	The proposed project will promote and support the sustainability of existing business, as well as assist in increasing local beneficiation and shared economic growth, through extending the LOM.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed project will ensure that additional community projects are initiated by the mine. This will complement the local socio-economic initiatives identified for the area.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	<p>Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10.</p> <p>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.</p>



Ref No.	Question	Answer
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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.	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.2	Reduce the need for transport of people and goods.	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 public transport),	Refer to Section 6 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.5.4	Compliment other uses in the area,	Refer to item 1.3 of this table (above). The proposed Kalgold Expansion Project entails the increase of production at an existing mine. The existing land use, which is the mining of gold, will therefore be complimented by the expansion of the mine.
2.5.5	Be in line with the planning for the area.	Refer to item 2.2.1 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 Kalgold Expansion Project area is outside an urban area.
2.5.7	Optimise the use of existing resources and infrastructure.	Refer to Section 3 of this Scoping 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).	Refer to Section 3 of this Scoping Report.



Ref No.	Question	Answer
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	Employment from the surrounding communities is recommended where possible, such that there will be no significant influx of additional workers to the area as a direct result of the proposed project.
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 to 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes.	The proposed land use for the Kalgold Expansion Project will be developed with effort made towards being environmentally sustainable in the long term. One of the key aspects to ensuring long terms land sustainability will be to ensure successful rehabilitation of disturbed areas.
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 item 1.7.3 of this table (above). The proposed Kalgold Expansion Project is associated with a portion of a strategic mineral resource (gold).
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).	The proposed project will allow the mine to continue contributing to the local, regional and national Gross Domestic Product (GDPs), and also to the local communities through continued employment of workers and local contractors, as well as other influences and community upliftment programmes that are undertaken by the mine through their SLP.
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.	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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?	The proposed project will ensure continued employment in the area, as well as programmes implemented from the mine's SLP.
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)?	In terms of the socio-economic impacts, the current knowledge gaps include:



Ref No.	Question	Answer
		<ul style="list-style-type: none"> The Social Scoping Report is solely based on secondary data. The sources consulted during the compilation of the report are not exhaustive but deemed sufficient to meet the Scope of Work for the current Scoping phase. No relevant information was deliberately excluded from the said 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 impacts on socio-economic conditions should the recommended mitigation and management measures be implemented and adhered to.
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?	As this project extends a current mining operation, and does not constitute a new mine, a cautious approach has been applied.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.



Ref No.	Question	Answer
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?	<p>Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.</p> <p>Moreover, Kalgold mine represented by Harmony will, in line with the regulatory requirements, provide financial provision to ensure that the mitigation measures proposed can be carried out. This aspect will also be further addressed in the EIA phase.</p>
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 a Scoping and EIA process, the applicant ensures that equitable access to the environment has been considered. Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10.
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 the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10.
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	Advertisements as well as site notices were distributed in and around the project area in English and Setswana to assist in understanding the project. Public meetings are also planned to be undertaken in the Scoping and EIA phases of the project.
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,	



Ref No.	Question	Answer
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	Also, public meetings will be undertaken such that women and youth are encouraged to participate and provide input which will then be recorded and submitted with the relevant reports to the competent authority.
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)?	<p>Refer to the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10.</p> <p>Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.</p> <p>Moreover, the current SLP is due for an update, as part of a separate undertaking.</p>
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?	<p>Workers at the mine are educated on a regular basis through toolbox talks on the environmental risks that may occur within their work environment, and adequate measures have been taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work in as well as the requirements of their job.</p> <p>These requirement will also be added into the EMPr to be developed in the EIA phase to ensure that future workers also received the appropriate training.</p>
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.	



Ref No.	Question	Answer
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).	Detail on exact number of employment opportunities created and related aspects will be provided in the EIA phase.
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 Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	The Scoping and EIA process requires governmental departments to communicate regarding any application. In addition, all relevant Departments and key stakeholders have been notified about the project by the EAP and registered as Interested and Affected Parties who will continue to be notified and engaged with regarding the project throughout the EIA process.
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 the public participation process undertaken to date in Section 7 of this Scoping Report. Public participation and consultation will continue during the EIA phase as described in Section 10. Furthermore, refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr. Moreover, the SLP will be updated and included in the EIA Report.



Ref No.	Question	Answer
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 Kalgold mine represented by Harmony will provide a Bank guarantee to the DMRE. The amount will be calculated using the published DMRE guideline document as required by section 54 (1) of the regulations <i>“Guideline Document for the evaluation of Quantum of Closure Related Financial Provision Provided by a Mine”</i> . Furthermore, in accordance with the NEMA Regulations Pertaining to the Financial Provision for Prospecting Exploration, Mining or Production Operations, an applicant or holder of a right or permit must determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining or production operations. In this regard, Harmony needs to include such financial provisions, and this will be prepared and submitted along with the EIA Report during the upcoming EIA phase.
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 for details of alternatives considered in this Scoping Report. This aspect will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.
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 identified impacts, their assessment and recommended mitigation measures in Section 9 of this Scoping Report. The impacts will be further explored in the EIA phase and findings thereof presented in the EIA Report and EMPr.



6 PROJECT ALTERNATIVES

As mentioned in Section 5 of this Scoping Report, the need for the proposed expansion project arises from the proposed increase in production capacity at the current Kalgold mine. The increase in production will require expansion of existing operations. As the application relates to expansion of existing operations, there are very limited feasible and/or reasonable alternatives that can be considered. These are described and motivated below.

6.1 ACTIVITY ALTERNATIVES

The current land use within and around the Kalgold Expansion Project area comprise largely of mining activities. Mining operations as a land use, are often viewed as directly competing and eventually replacing existing land uses. However, a mixed land use approach consisting of both mining and continued agriculture is possible. Current agricultural activities in the vicinity and within the proposed Kalgold Expansion Project area will be able to continue where no mining infrastructure is located, particularly because the proposed project mostly involves limited expansion of already existing infrastructure since the mine is already in operation. In this regard, no activity alternatives will be considered for this project.

6.2 LOCATION ALTERNATIVES

The land use in and around the proposed Kalgold Expansion Project area predominantly consists of agricultural activities (crop farming) with mining related activities in its vicinity. The development location for the expansion was selected based on the fact that the proposed expansion project is required for production increase and expansion of the already existing Kalgold operation. In this regard, no other location alternative is being considered for the Kalgold Expansion Project. The preliminary environmental impacts associated with this location alternative are discussed in Section 9 of this Scoping Report and will be further investigated in the EIA phase.

6.3 DESIGN OR LAYOUT ALTERNATIVES

The preliminary positions or layout of the various infrastructure has been identified through various technical considerations. A feasibility study was conducted to determine the proposed infrastructure required to meet the expansion objectives. As there is various existing infrastructure, the proposed infrastructure has to be located in such a way that is not an obstruction to existing operational infrastructure. The following layout alternatives were considered as part of the feasibility studies (see Figure 6 below):

- Alternative L1a: Production/processing Plant Alternative 1.
- Alternative L1b: Production/processing Plant Alternative 2.
- Alternative L2a: Explosives Magazine Alternative 1.
- Alternative L2b: Explosives Magazine Alternative 2.
- Alternative L3a: New Tailings Storage Facility Alternative 1.
- Alternative L3b: New Tailings Storage Facility Alternative 2.

Production Plant Alternative 2 (Alternative L1b) was found to be not technically and environmentally feasible due to its proximity to a drainage line and requirement to build haul roads across drainage lines among other technical considerations. This alternative will not be considered further in the Scoping and EIA process. Explosives Magazine Alternative 2 (Alternative L2b) was found to be not technically feasible as the location is proposed for the expansion of the low grade stockpile (an existing authorised activity) and also requires a safety clearance radius around it. Explosives Magazine Alternative 1 (Alternative L2a) has been moved to another position to cater for the safety requirements. In this regard this alternative will not be considered further in the Scoping and EIA process. Both alternatives of the new Tailings Storage Facility were found to not be technically feasible at this stage and therefore will no longer be considered. It is now proposed to recommission the existing TSF at a low deposition rate.

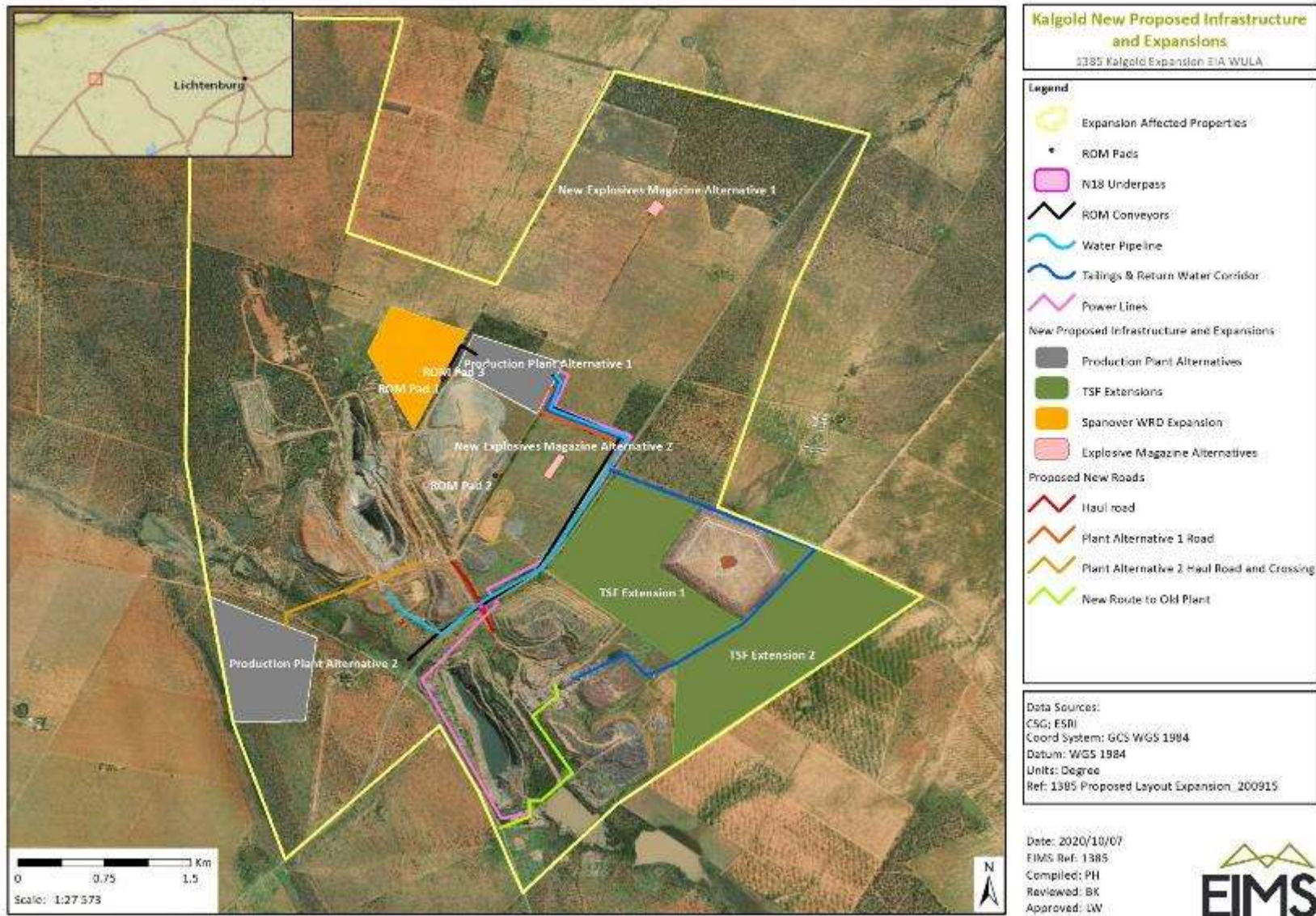


Figure 6: Location alternatives considered during feasibility



The preliminary positions or layout as indicated in Figure 3 has been assessed with regards to potential impacts on the receiving environment as part of the Scoping phase. The preliminary layout will be further investigated in the EIA phase. If any infrastructure is planned to be located in areas identified as being of high environmental sensitivity or if any other significant environmental concerns are noted with regards to the proposed design and / or layout, then the layout may require to be amended based on these findings. More details regarding the preliminary layout and on-site sensitivities will be provided in the EIA phase once the detailed specialist impact assessment studies have been completed. This scoping phase micro-siting information will be provided to the specialists to inform their impact assessments during the EIA phase.

6.4 NO-GO ALTERNATIVE

The no-go option means 'do nothing' or the option of not undertaking the proposed Kalgold Expansion Project or any of its alternatives. The 'do nothing' alternative or keeping the current *status quo* of production also provides the baseline against which the impacts of other alternatives should be compared.

During construction and operation, the local area is likely to experience an economic injection in the form of employment creation, taxes, CSI and SLP spend, and increased business and consumer spending. In addition, it is evident from the scoping studies that the proposed expansion project will have a potentially limited environmental impact on the receiving environment. This is mainly due to the fact that the site is an existing mine and the expansion project only entails additional new infrastructure on properties already affected by current mining activities.

Various other economic changes and impacts will not be realized if the project does not go ahead, these include:

- Employment creation, which impacts on people's livelihoods.
- Diversification of economic activities: The project could stimulate a process of change from one type of production to another type (e.g. agricultural to mining). This will diversify the local economy but could also draw labour from other sectors.
- Increased tax income: Continued and increased tax income for the local authority who can apply the money to LED.

The no-go alternative would mean that the benefits of local and regional employment associated with the expansion project would not be realised in the long term. The potential employment and economic benefits will therefore be forgone. The no-go alternative would maintain the current environmental *status quo* at the site.



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 opinions are taken into account, and a record included in the reports submitted to relevant authorities. The process aims to ensure that all stakeholders are provided an 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 in order to ensure and promote:

- Compliance with international best practise options;
- Compliance with national legislation;
- Establish and manage relationships with key stakeholder groups; and
- Encourage involvement and participation in the environmental study and authorisation / approval process.

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

- Provide an opportunity for I&APs to obtain clear, accurate and comprehensible information about the proposed activity, its alternatives or the decision and the environmental impacts thereof;
- Provide I&APs with an opportunity to indicate their view-points, issues and concerns regarding the activity, alternatives and / or the decision;
- Provide I&APs with the opportunity to suggest ways of avoiding, reducing or mitigating negative impacts of an activity and enhancing positive impacts;
- Enable the applicant to incorporate the needs, preferences and values of I&APs into the activity;
- Provide opportunities to avoid and resolve disputes and reconcile conflicting interests;
- Enhance transparency and accountability in decision-making;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and / or prevent environmental impacts associated with the project.

The PPP for this project has been undertaken in accordance with the requirements of the MPRDA and NEMA, as well as 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.

7.1 LEGAL COMPLIANCE

The PPP must comply with several important sets of legislation that require public participation as part of an application for authorisation or approval, namely:

- The Mineral and Petroleum Resources Development Act (Act No. 28 of 2002 – MPRDA);
- The National Environmental Management Act (Act No. 107 of 1998 – NEMA);
- The National Environmental Management Waste Act (Act No. 59 of 2008 – NEMWA); and
- The National Water Act (Act No. 36 of 1998 – NWA).

Adherence to the requirements of the above-mentioned Acts will allow for an Integrated PPP to be conducted, and in so doing, satisfy the requirement for public participation referenced in the Acts. The details of the Integrated PPP followed are provided below.



7.2 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES

The I&AP databases compiled for various past environmental authorisation processes in the vicinity of the proposed Kalgold Expansion Project have been utilised towards compiling a pre-notification register of key I&APs to be notified of the Environmental Authorisation Application. The I&AP database includes amongst others: landowners, communities, regulatory authorities and other specialist interest groups. Additional I&APs have been registered during the initial notification and call to register period. The I&APs database will continue to be updated throughout the duration of the EIA process. A full list of I&APs is attached in Appendix C.

7.2.1 LIST OF AUTHORITIES IDENTIFIED AND NOTIFIED

The following Government Authorities were notified of the proposed project:

- National Department of Environment, Forestry and Fisheries
- National Department of Mineral Resources and Energy
- National Department of Agriculture
- National Department of Rural Development and Land Reform
- National Human Settlements, Water and Sanitation
- Cooperative Governance and Traditional Affairs (COGTA)
- South African National Roads Agency Limited (SANRAL)
- South African National Parks (SanParks)
- South African Heritage Resources Agency (SAHRA)
- North-West Provincial Government

7.2.2 OTHER KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

The following key stakeholders have been identified and notified of the proposed project:

- South African National Biodiversity Institute (SANBI)
- Birdlife South Africa
- Ward Councillors
- Ratlou Local Municipality
- Endangered Wildlife Trust
- Ngaka Modiri Molema District Municipality
- Landowners and Adjacent landowners
- Eskom Holdings SOC Limited

7.3 SCOPING REPORT NOTIFICATION OF I&APS

The PPP commenced on the 26th of March 2021 with the placement of site notices and call to register ending on the 9th of April 2021. The Scoping Report notifications were conducted as presented below.

7.3.1 REGISTERED LETTERS, FAXES AND EMAILS

Registered letters, emails and facsimiles (faxes) were prepared and distributed to the identified relevant authorities, affected and adjacent landowners and legal occupiers, ward councillors and other pre-identified key stakeholders. The notification documents included the following information:

- The purpose of the proposed project;
- Details of the MPRDA, NEMA and NWA Regulations that are anticipated to be applicable and must be adhered to;
- List of anticipated activities to be authorised;
- Location and extent of activities to be authorised;
- Details of the affected properties (including a locality map or an indication of where the locality map may be viewed or obtained);



- Brief but sufficient detail of the intended operation to enable I&APs to assess / surmise what impact the project will have on them or on the use of their land (if any);
- Scoping Report Review period; and
- Contact details of the EAP.

In addition, a registration form was included in the registered letters, emails and facsimiles distributed to I&APs and it included a request for the following information from I&APs:

- Provide information on current land uses and their location within the area under consideration;
- Provide information on the location of environmental features on site;
- State how and to what standard or extent they perceive these identified features are likely to be impacted upon by the proposed project;
- Provide information on how they consider that the proposed Kalgold Expansion Project will impact on them or their socio-economic conditions;
- Make proposals as to how the potential impacts on identified environmental features, their infrastructure, and socio-economic concerns may be managed, avoided or mitigated;
- Details of the landowner and information on lawful occupiers;
- Details of any communities existing within the area;
- Details of any Tribal Authorities within the area;
- Details of any other I&APs that need to be notified;
- Details on any land developments proposed; and
- Any specific comments or concerns regarding the proposed Kalgold Expansion Project application for environmental authorisation.

Proof of the registered letters, emails and facsimiles that were distributed during the initial notification and call to register period are attached in Appendix C.

7.3.2 SITE NOTICES AND POSTERS

Four (4) Site notices were placed along the perimeter of the proposed project area and its surroundings on 29 March 2021. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

Please refer Appendix C for proof of site notice and poster placement.

7.3.3 BACKGROUND INFORMATION DOCUMENT

Included in the I&AP notification letters, emails and facsimiles, was a Background Information Document (BID). The BID includes the following information:

- Project name;
- Applicant name;



- Project location;
- Map of affected project area;
- Description of the environmental authorisation application process;
- Information on document review; and
- Relevant EAP contact person details for the project.

Please refer to Appendix C for a copy of the BID issued to I&APs.

7.3.4 ONE-ON-ONE CONSULTATION

Further to the site notices and A3 poster placement, one-on-one consultations with the community were conducted where possible, whereby the EAP/Public Consultation Consultant endeavoured to consult with as many I&APs (affected and surrounding landowners, farm workers and land occupiers within and adjacent to the proposed project area, as well as the community at large) during the site notice and poster placement site visit. Encountered I&APs were presented with an A4 size notification as well as a verbal explanation of the project and the EIA and public participation processes.

7.3.5 NEWSPAPER ADVERTISEMENTS

English and Setswana advertisements were placed on the 26th of March 2021 in the Mahikeng Mail newspaper which was indicated to have the widest reach within the project area and its vicinity towards notifying the public regarding the proposed Kalgold Expansion Project.

The newspaper advertisements included the following information:

- Project name;
- Applicant name;
- Project location;
- Description of the environmental authorisation application process;
- Legislative requirements; and
- Relevant EAP contact person details for the project.

7.4 SCOPING REPORT REVIEW PERIOD

The Scoping Report has been made available for public review at the Kalgold Mine and at the Kraaipan Tribal Council from the 4th of May 2021 until the 3rd of June 2021, for a period of 30 days.

7.5 PUBLIC MEETING

A public open day is scheduled during the Scoping Report public review period. In light of the Covid-19 pandemic an open day meeting is proposed to ensure venue number restrictions as per the directions issued in line with the Disaster Management Act (Act 57 of 2002).

The main objectives of the public open day are to share available information with the I&APs pertaining to the findings of the Scoping phase studies, as well as to provide the I&APs with the opportunity to ask questions, raise potential issues and concerns, and to make comments on the proposed project.

7.6 COMMENTS AND REPOSES

Comments raised will be addressed in a transparent manner and the full details (such as the comment received, the name of the I&AP who commented, the issue raised and the main aspect of the raised issue, as well as the response provided to the I&AP) will be included in the Public Participation Report.



8 ENVIRONMENTAL ATTRIBUTES AND BASELINE

This section of the Scoping Report provides a description of the environment that may be affected by the proposed Kalgold Expansion Project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed extension have been described. Baseline information sourced from the various scoping phase specialist studies has been utilised to prepare the environmental attributes baseline below.

8.1 TOPOGRAPHY AND REGIONAL DRAINAGE

The topography in the vicinity of the mining area is flat but undulating and ranges from 1245 metres above mean sea level (mamsl) in the south-east to 1220 mamsl in the north-west. The regional catchment in which the mine is located is characterised by generally northwesterly flowing drainages leading to the Molopo River (GCS, 2008).

The catchment is drained by a number of small tributaries including the Mareetsane River, Morokwa River and Koedoe Spruit drainages. These converge and flow into the Setlagole River which drains north-west into the Molopo River (Figure 7). The Morokwa River flows along the southern boundary of the mine and has been diverted around D-Zone pit. This river is generally dry and only flows for short periods after rainfall events. There is generally no flow in the Morokwa drainage and there are therefore no riparian water users in the area (GCS, 2008). However, certain landowners have constructed dams along the drainage which impound stormwater runoff after high rainfall. This surplus water is not normal and is available only for short periods. Baseflow contribution to river and stream features represents one of the primary natural groundwater discharge processes.

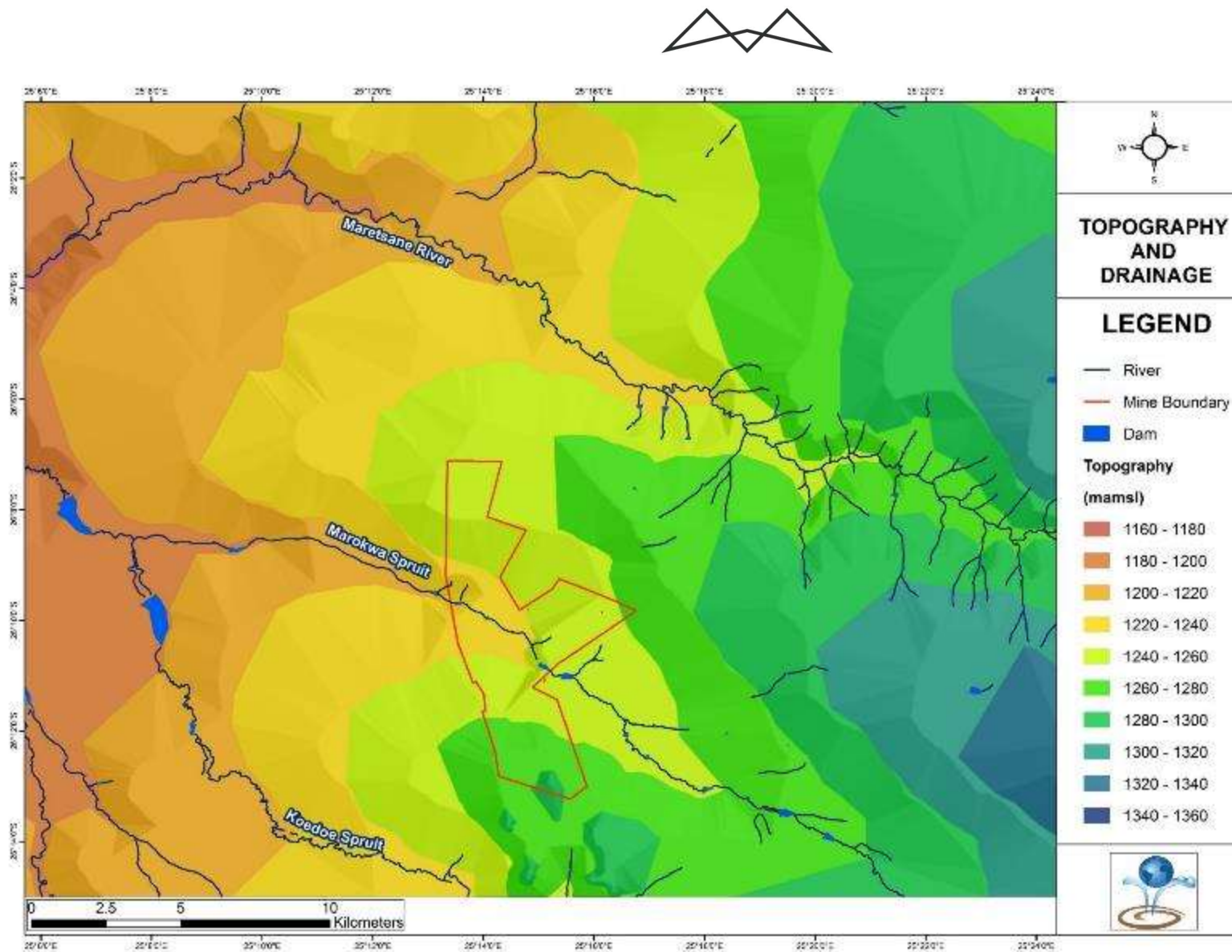


Figure 7: Regional topography and drainage for the Kalgold Expansion Project area (MvB Consulting, 2021)



8.2 GEOLOGY AND SOILS

The Kalgold operation is located within the Kraaipan Greenstone Belt, which forms part of the larger Amalia-Kraaipan Greenstone terrain (Wilson and Anhaeusser, 1998). The Kraaipan Greenstone Belt consists of north trending linear belts of Archaean metavolcanic and metasedimentary rocks, separated by granitoid units. Mineralisation occurs in shallow dipping quartz veins, which occur in clusters or swarms, within the steeply dipping magnetite-chert banded iron formation. Disseminated sulphide mineralisation, dominated mostly by pyrite, occurs around and between the shallow dipping quartz vein swarms.

The following rocks are associated with the ore body:

- The footwall consists of mafic schist and the hanging wall of greywacke, shale, sandstone, conglomerate and siltstone.
- The host rock is Banded Iron Formation (BIF) intercalated with shale. The greenstone formations are exposed in discontinuous outcrops of steeply dipping rocks which define three narrow, sub-parallel belts that strike approximately north-south (GCS, 2008).

The ore body mined at Kalgold occur within the central belt which comprises banded iron formation (BIF), magnetite quartzite, chert, greywacke, shale and schist. The gold mineralization is hosted by steeply dipping BIF that are interbedded with schist, shale and greywacke. The greenstones are hosted within intrusive granite and gneiss. The Kraaipan greenstone is intruded by numerous east-west trending dykes. One such dyke cuts across the southern boundary of the mining lease area. The area is further characterised by abundant faults with displacement from a few metres to hundreds of metres. Groundwater movement in the area takes place in a northerly direction mainly along strike on the contacts of the cherty banded iron units and is affected by crosscutting dykes and faults (GCS, 2008). Figure 8 shows the regional geology of the project area.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae29, Ah17 and Ai3 land types. A description of these land types is as follows (see Figure 9):

- Land type Ai3 is dominated by the foot-slopes terrain unit and has a slope of 0 to 1 %. The dominant soil forms expected in this land type is the Clovelly (Cv) and the Fernwood (Fw). Both these soils are expected to be sandy with a clay percentage of around 5 % or less and have depths exceeding 1.2 m.
- Land type Ah17 has a good mix of terrain units but predominantly the slope is between 0 and 5 %. The dominant soil forms expected in this land type is the Clovelly (Cv) and the Hutton (Hu). Both these soils are expected to be sandy with a clay percentage of around 5 % or less and have depths exceeding 1.2 m and should have a good land capability associated with them.
- Land type Ae29 is dominated by the mid-slopes terrain unit and has a slope of 0 to 10 %. The dominant soil form expected in this land type is the Hutton (Hu). The expected clay content for these soils are between 5 % and 15 % and the depths range from 750 mm to deeper than 1200 mm.

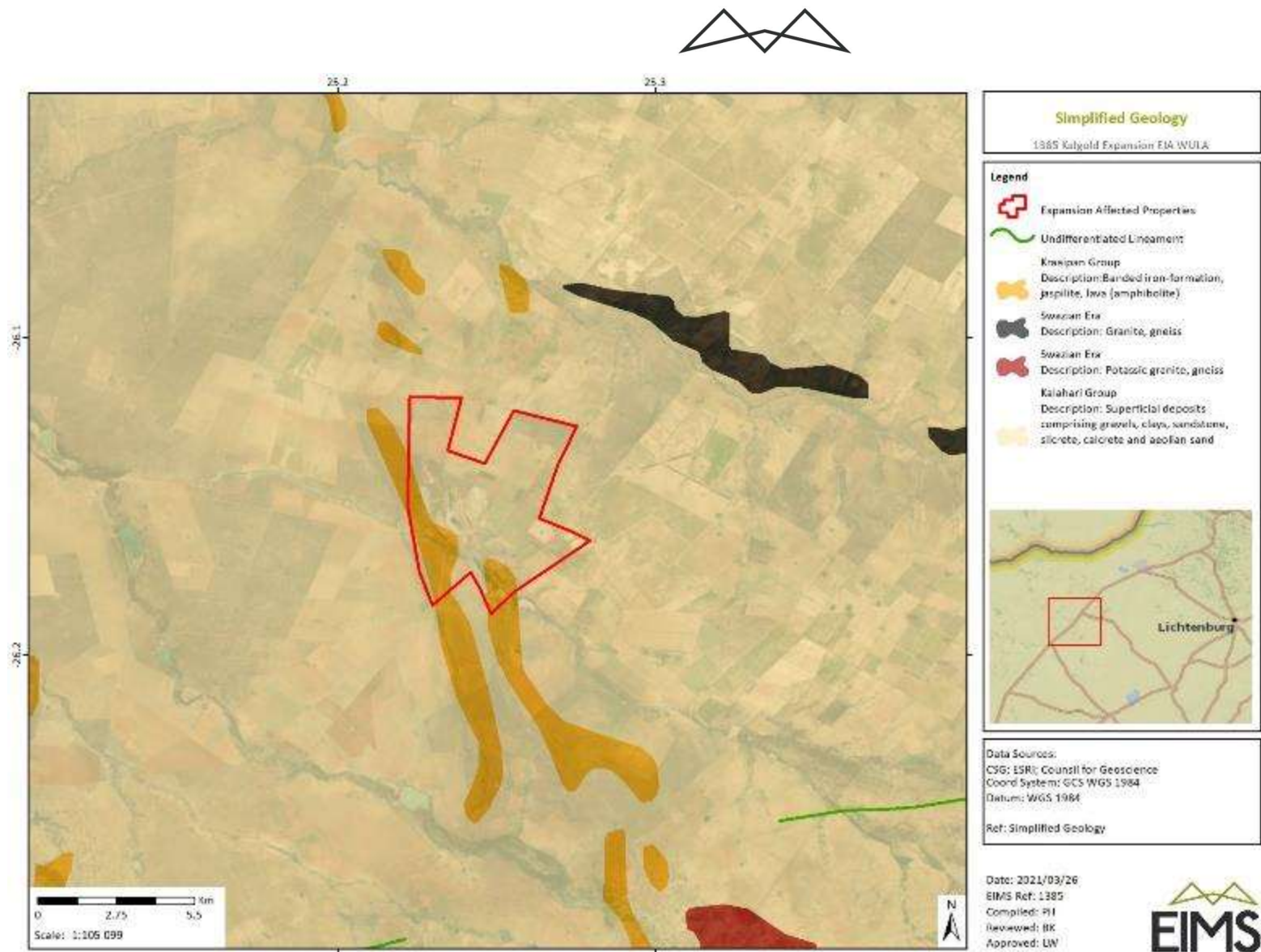


Figure 8: Regional geological map

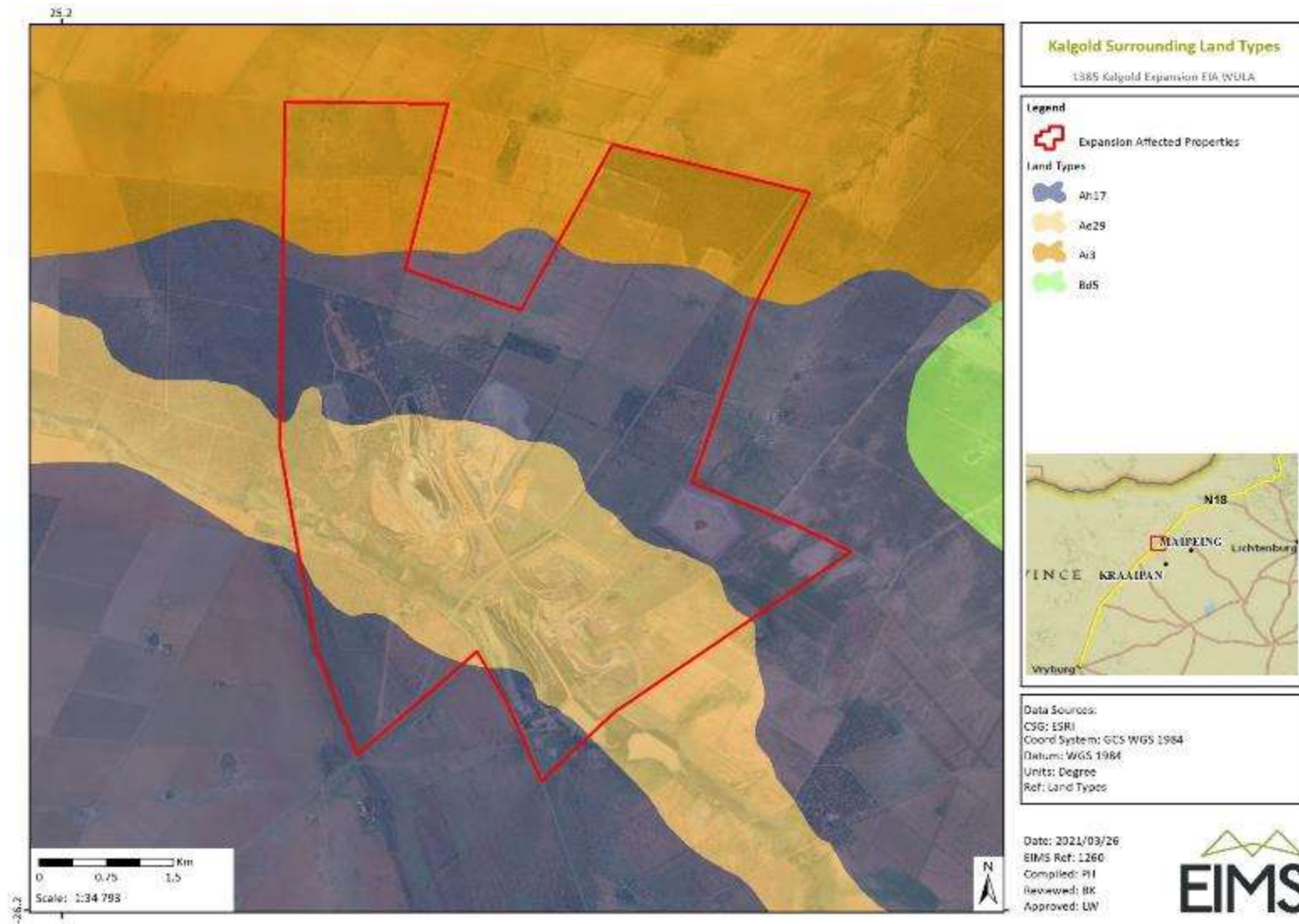


Figure 9: Land types in the study area



8.3 CLIMATE

The project area is characterised by summer rainfall with very dry winters. The mean annual precipitation (MAP) is about 400–480 mm. There is frost frequent in winter, Mucina & Rutherford (2006). Figure 10 illustrates the climate summary for the region

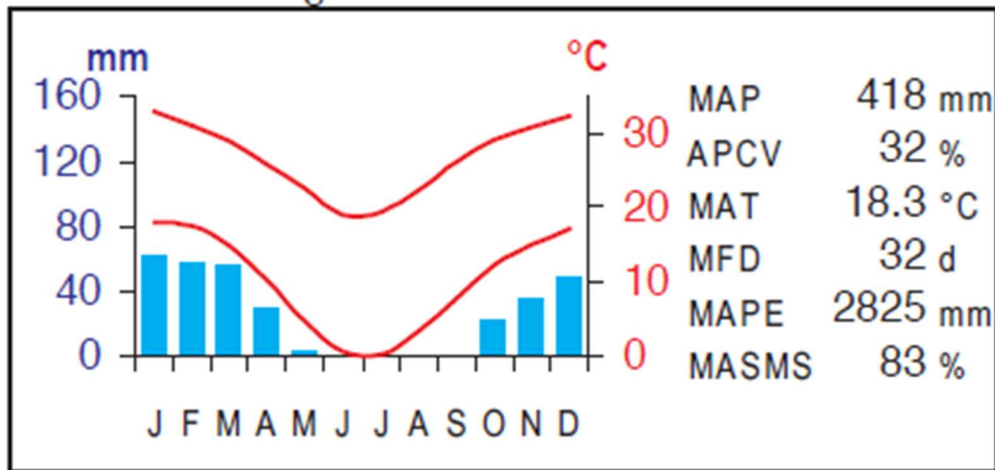


Figure 10: The climate summary for the region (Mucina & Rutherford, 2006)

8.4 LAND CAPABILITY

The project area is flat in relief. The land type data suggest that soils of the Hutton, Clovelly, and Fernwood forms are present in the landscape. The average land capability based on the land type data is that of a class III (moderate cultivation). Class III land would pose moderate limitations to agriculture with some erosion hazard and would require special conservation practice and tillage methods. The farming method for this capability would require the rotation of crops and ley (50%). The current land use seems to be croplands in the north with the remaining undisturbed area being veld/grazing. The disturbed areas are classified as mining land use.

8.5 SOCIAL, DEMOGRAPHICS AND EMPLOYMENT STATISTICS

The project falls within the Ngaka Modiri Molema District Municipality (NMMDM). The district covers a geographical area of 28 440 km² and is bordered by Botswana to the north and west, the Dr Ruth Segomotsi Mompati District to the southwest, the Dr Kenneth Kuanda District to the southeast and the Bojanala District to the east. The district is one of four districts of the North West Province and consists of five local municipalities (Ratlou, Mahikeng, Ramotshere Moila, Ditsobotla and Tswaing).

The Kalgold mining area (including all existing and newly proposed infrastructure) is located in Ward 11 of the Ratlou Local Municipality (RLM11). RLM11 covers a geographical area of 1 589km² and in 2011, was home to 7 155 people (with a population density of 4.5 people per km² – indicative of an area that is largely rural in nature). In 2001 the ward had a total population of 6 489 people, which means that the area experienced a positive population growth rate of around 1.03% per annum. Based on this growth rate, the 2018 population size is an estimated 7 670 people.

The majority of the current population in RLM11 are Black African (92.8%), followed by the White (6.1%) population group. Although more new Black African people settled in the ward (381), the largest proportional in-migration was under the White population group who more than doubled in population size – from 171 people in 2001 to 438 in 2011.

The most widely spoken languages in the ward are Setswana (85.9%) and Afrikaans (6.2%). All the other official languages together account for the remaining 7.9%.

The majority of RLM11's population (96.4%) are South African and native to the North West Province (91.4%). There has been a definite increase in the male population in RLM11 between 1996 (46.8%) and 2001 (49.2%)



and 2011 (54.0%). This, coupled with the fact that the majority of the population are in the economically active age group of 15-64 (58.9%) and the positive population growth rate in a predominantly rural ward, is indicative of existing population in-migration, i.e. it is likely that the mining activities in the ward attract people to the area – either in the form of legitimate mine workers or in the form of job seekers.

The education levels in the ward are fairly low, with only 13.9% of the adult population (those aged 20 years and older) having completed their secondary education (Grade 12). Only 3.1% of the population have completed some form of tertiary education (diploma, degree, etc.). An overview of the educational profile of the ward is provided in Figure 11 .

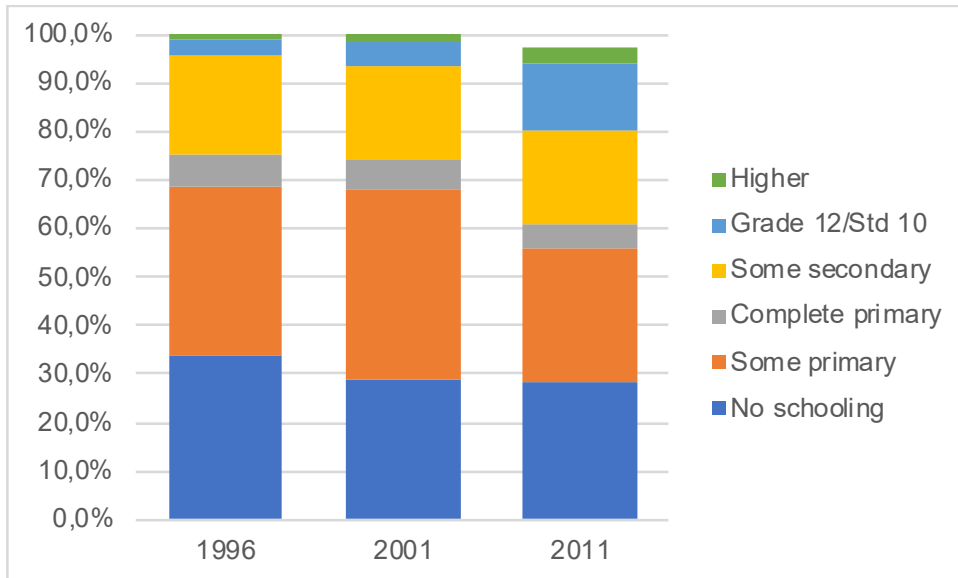


Figure 11: Overview of the Education Profile of RLM11 between 1996 and 2011

The employment rate in RLM11 amongst the labour force increased year on year – from 42.1% in 1996 to 57.7% in 2001, to 73.7% in 2011. In other words, in 2011, 73.7% of the site-specific study area’s economically active population (58.9% of the total population) were employed. An overview of the site-specific study area’s employment profile is provided in Figure 12.

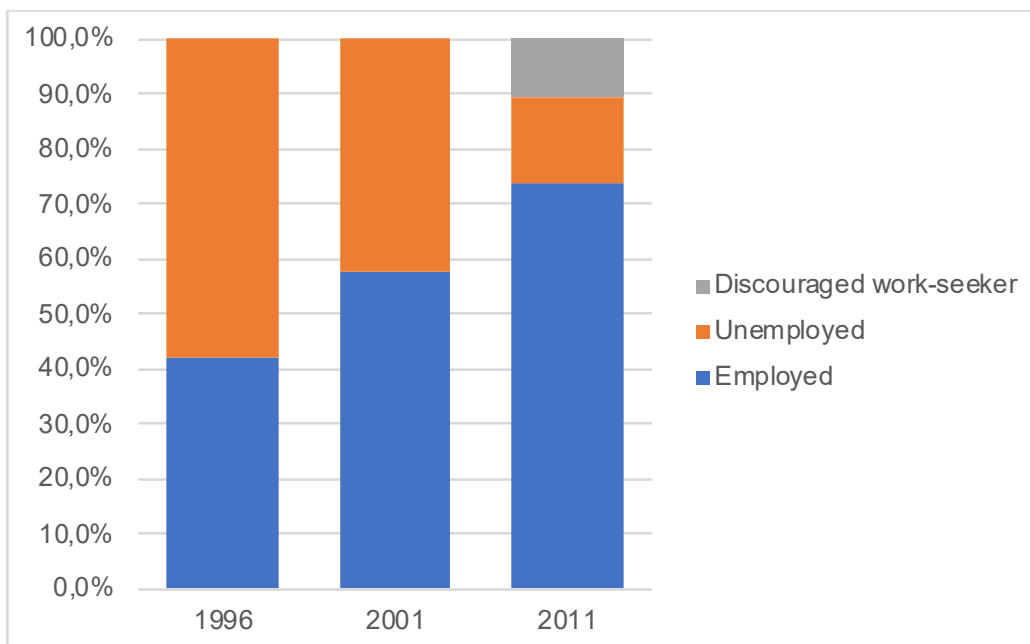


Figure 12: Overview of the Site-Specific Study Area’s Employment Profile



However, of those employed, more than half (57.1%) are employed in private households with a further 14.4% employed in the informal sector. Despite there being a consistent improvement in the monthly income profile of the local households (in 2001 almost all of the households in RLM11 - 88.8% - lived in absolute poverty, which has been reduced to 58.4% of households in 2011), it would appear that the majority of those employed are still employed in minimum wage jobs (unskilled work such as house-keeping and gardening).

The RLM has developed a Local Economic Development (LED) strategy as part of its Integrated Development Plan (IDP, 2016). The strategy provides the municipality with guidelines on how to create and sustain economic development. The LED strategy was adopted in August 2012 and identified ten short- and longer-term goals to focus the municipalities LED efforts. These include:

- Strengthening the municipality's local stake in mining;
- Establishing a Further Education and Training (FET) college;
- The development and support of co-operatives;
- Rural development and agrarian reform;
- Branding and marketing;
- The implementation of learnerships, skills programmes and internships;
- Local business support (through procurement of services);
- Local and foreign investment attraction;
- Soft infrastructure development to increase the municipality's competitive advantage; and
- Development and implementation of a tourism strategy.

8.6 CULTURAL AND HERITAGE RESOURCES

A heritage scoping assessment for the Kalgold Expansion Project was undertaken by PGS Heritage in October 2020 and revised in March 2021. The high-level archival research focused on available information sources that were used to compile a general background history of the project area and surrounds. The map analysis and previous studies shows that number of known possible heritage features were identified in the study area (Figure 13).

Based on the SAHRIS database, a full Palaeontological Impact assessment will be required as part of the HIA study. As can be viewed in Figure 14, most of the area is considered moderately sensitive. Yellow demarcates approximate study area.

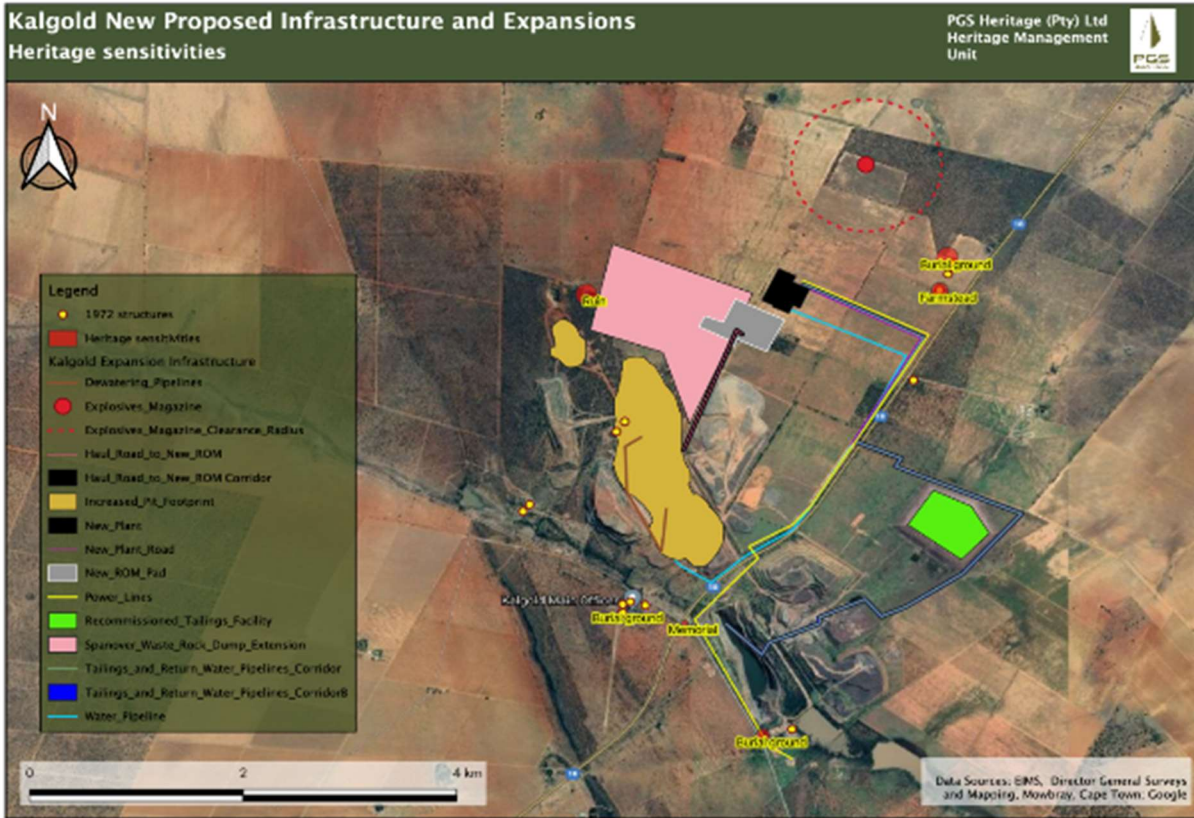


Figure 13: Preliminary heritage sensitivity map

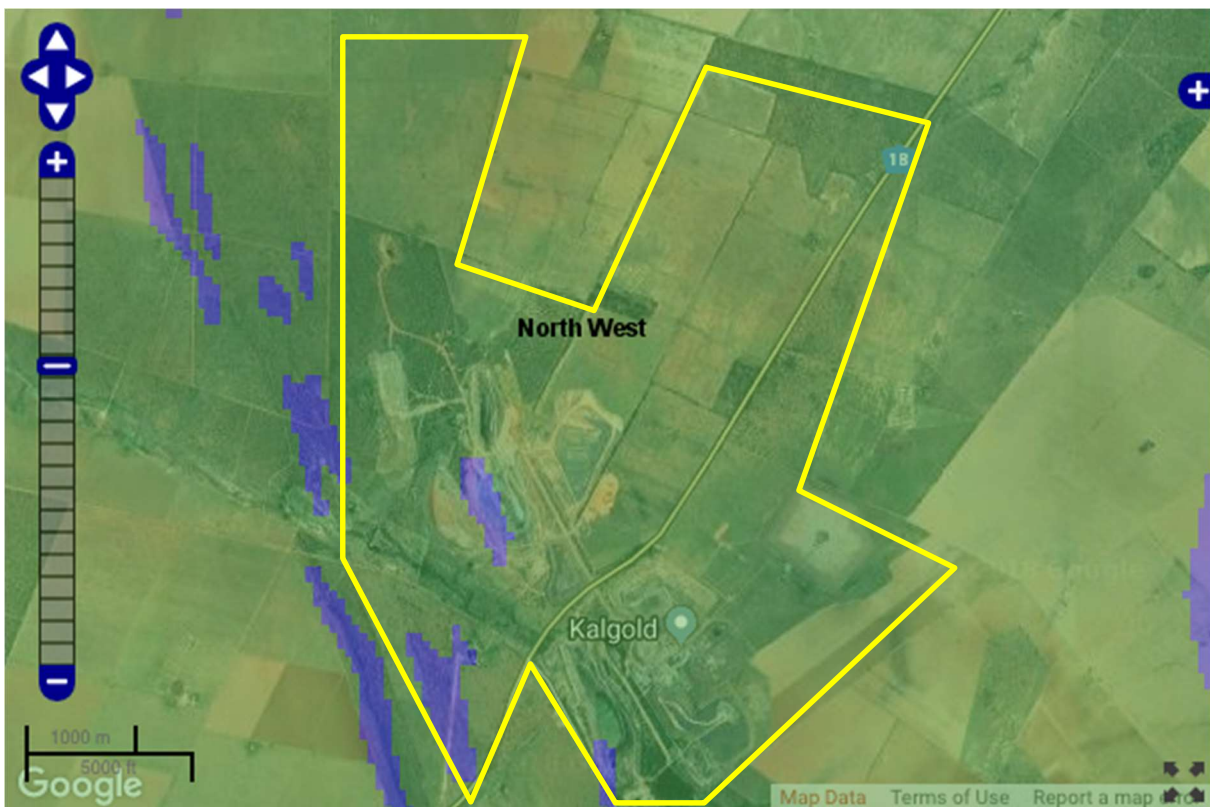


Figure 14: Palaeontological Heritage Sensitivity map.



8.7 FLORA

The findings of the Terrestrial Ecology Study by The Biodiversity Company (TBC) in October 2020 were utilised for the flora and fauna baseline assessment in this section, the full report is available in Appendix D. The Kalgold Expansion Project area is situated within the Savannah biome. The savanna vegetation of South Africa represents the southern-most extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savannah biome include:

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

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

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

The savanna biome comprises many different vegetation types. The project area is situated within one vegetation type; namely the Mafikeng Bushveld vegetation type according to Mucina & Rutherford (2006) (Figure 15).

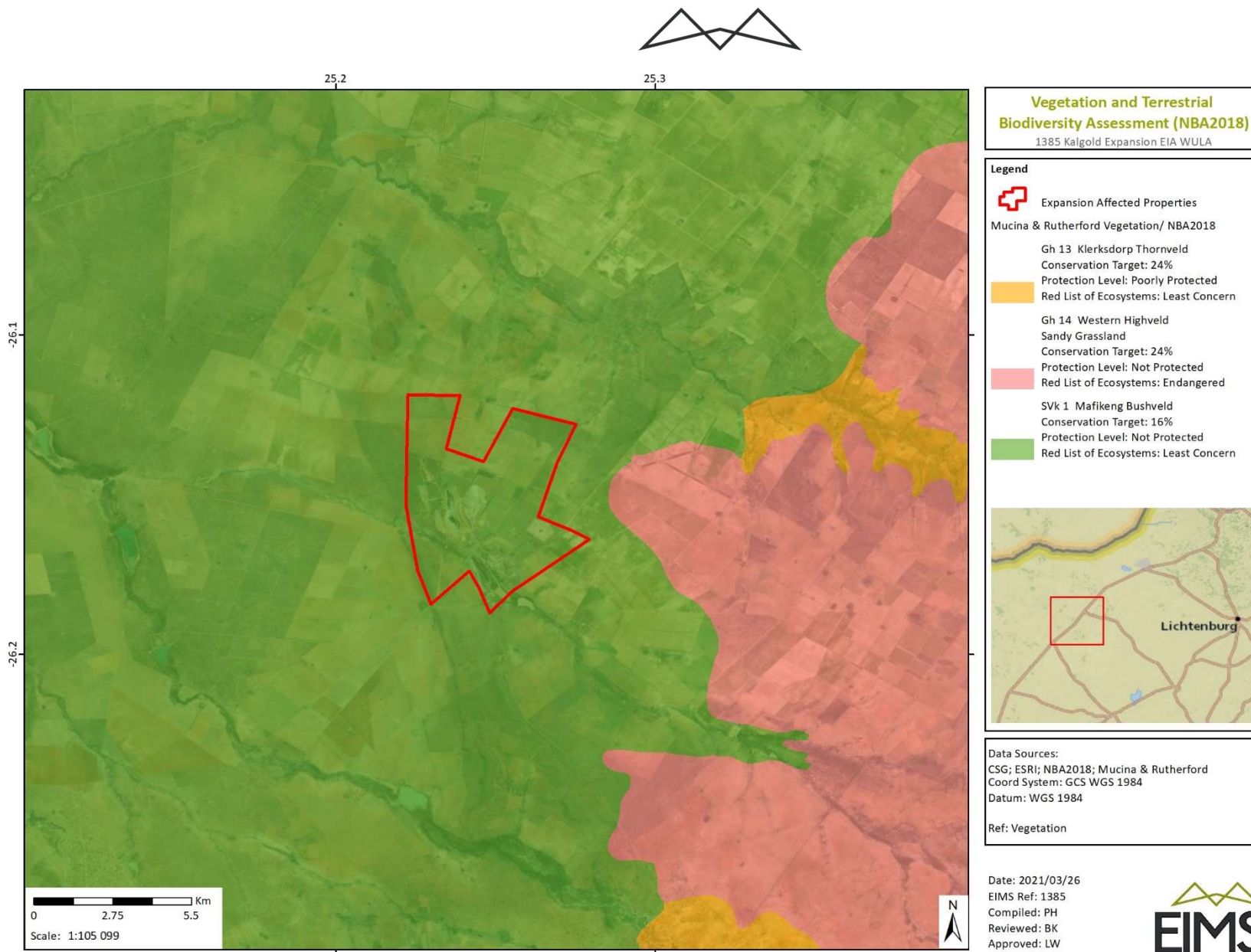


Figure 15: The Kalgold Expansion Project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)



8.7.1 CONSERVATION STATUS

The Mafikeng Bushveld vegetation type is listed as Vulnerable (Mucina & Rutherford, 2006). The conservation target for the vegetation type is at 16%. No section of this vegetation type is conserved in statutory conservation areas, but a very small area is conserved in the Mmabatho Recreation Area. About 25% of this vegetation type is considered to be already transformed, mainly due to cultivation and urban development.

Based on the Plants of Southern Africa (BODATSA-POSA, 2016) database, 285 plant species have the potential to occur in the project area and its surroundings. Of these 285 plant species, two (2) species are listed as being Species of Conservation Concern (SCC) these are listed in Table 9.

Table 9: Plant Species of Conservation Concern (SCC) expected to occur within the region of the project area (BODATSA-POSA, 2016).

Family	Scientific Name	Author	SANBI listing (2017)	Ecology
Asphodelaceae	<i>Aloe braamvanwykii</i>	Gideon F.Sm. & Figueiredo	EN	Indigenous; Endemic
Apocynaceae	<i>Brachystelma canum</i>	R.A.Dyer	CR	Indigenous; Endemic

8.8 FAUNA

Faunal assessment at the proposed project area included the scoping of the following faunal categories: avifauna, mammals as well as reptiles and amphibians. The regional species expected to occur on site for each faunal category are presented below.

8.8.1 AVIFAUNA

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 309 bird species have the potential to occur in the vicinity of the project area (pentads 2605_2505; 2605_2510; 2605_2515; 2610_2505; 2610_2510; 2610_2515; 2615_2505; 2615_2510; 2615_2515). Of the potential bird species, nineteen (19) species (6.14%) are listed as SCC either on a regional (17) or global scale (11) (Table 10).

The SCC include the following:

- One (1) species that is listed as Critically Endangered (CR) on a regional scale;
- Four (4) species that are listed as Endangered (EN) on a regional basis;
- Four (4) species that are listed as Vulnerable (VU) on a regional basis; and
- Eight (8) species that are listed as Near Threatened (NT) on a regional basis.

On a global scale, one (1) species is listed as CR, two (2) species are listed as EN, two (2) species are listed as VU and six (6) species as NT (Table 10).

Table 10: List of bird species of regional or global conservation importance that are expected to occur at the site.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Ardeotis kori</i>	Bustard, Kori	NT	NT	High
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC ²	NT	Moderate
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC	Low
<i>Ciconia nigra</i>	Stork, Black	VU	LC	Moderate
<i>Circus macrourus</i>	Harrier, Pallid	NT	NT	Moderate

² Least Concern



Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Coracias garrulus</i>	Roller, European	NT	LC	Moderate
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC	High
<i>Falco chicquera</i>	Falcon, Red-necked	Unlisted	NT	High
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR	Moderate
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN	Low
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC	High
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT	High
<i>Pelecanus rufescens</i>	Pelican, Pink-backed	VU	LC	Moderate
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT	Low
<i>Phoenicopterus ruber</i>	Flamingo, Greater	NT	LC	Low
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU	High
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC	Moderate
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	High
<i>Torgos tracheliotus</i>	Vulture, Lappet-faced	EN	EN	Moderate

8.8.2 MAMMALS

The IUCN Red List Spatial Data (IUCN, 2017) lists 67 mammal species that could be expected to occur within the project area. Of these species, 8 are medium to large conservation dependant species, such *Ceratotherium simum* (Southern White Rhinoceros) and *Tragelaphus oryx* (Common Eland) that, in South Africa, are generally restricted to protected areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list. They are however still included in the expected species list.

Of the remaining 59 small to medium sized mammal species, ten (10) (17%) are listed as being of conservation concern on a regional or global basis (Table 11).

The list of potential species includes:

- Four (4) that are listed as VU on a regional basis; and
- Six (6) that are listed as NT on a regional scale.

On a global scale, 1 species is listed as EN, 3 are listed as VU and 2 as NT (Table 11).

Table 11: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016).

Species	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC
<i>Crocuta crocuta</i>	Spotted Hyaena	NT	LC
<i>Felis nigripes</i>	Black-footed Cat	VU	VU
<i>Myodomys albicaudatus</i>	White-tailed Rat	VU	EN
<i>Panthera pardus</i>	Leopard	VU	VU



Species	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Parahyaena brunnea</i>	Brown Hyena	NT	NT
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC
<i>Rhinolophus denti</i>	Dent's Horseshoe Bat	NT	LC
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	VU	VU

8.8.3 HERPETOFAUNA (REPTILES & AMPHIBIANS)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Reptile Map database provided by the Animal Demography Unit (ADU, 2019) 20 reptile species have the potential to occur in the project area. None of the expected species are SCCs (IUCN, 2017).

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the Amphibian Map database provided by the Animal Demography Unit (ADU, 2017) 16 amphibian species have the potential to occur in the project area. One (1) amphibian species of conservation concern should be present in the project area according to the above-mentioned sources but in situ confirmation is required (Table 12).

Table 12: List of reptile species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; Bates *et al.*, 2014).

Species	Common name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
<i>Crocodylus niloticus</i>	Nile Crocodile	VU	LC	Low

8.9 HYDROLOGY AND WETLANDS

The hydrological study informing this hydrology baseline was conducted by Hydrologic Consulting in October 2020 and updated in March 2021, the full hydrology report is presented in Appendix D.

The site is positioned within quaternary catchment D41B which is drained by the primary Setlagole River. Figure 16 presents the WMA and quaternary catchment in relation to the study site. The site is intersected by the Morokwa River which is the most significant watercourse in the region (about the site). The Morokwa River is classified as a non-perennial river according to the NGI's 1:50,000 topographical map data.

Two minor non-perennial tributaries to the Morokwa River intersect the site, while a third minor non-perennial river (which is not a tributary to the Morokwa River), intersects the north-eastern corner of the site. Figure 17 presents the results of the initial identified site sensitivities as they relate to the surface water environment.

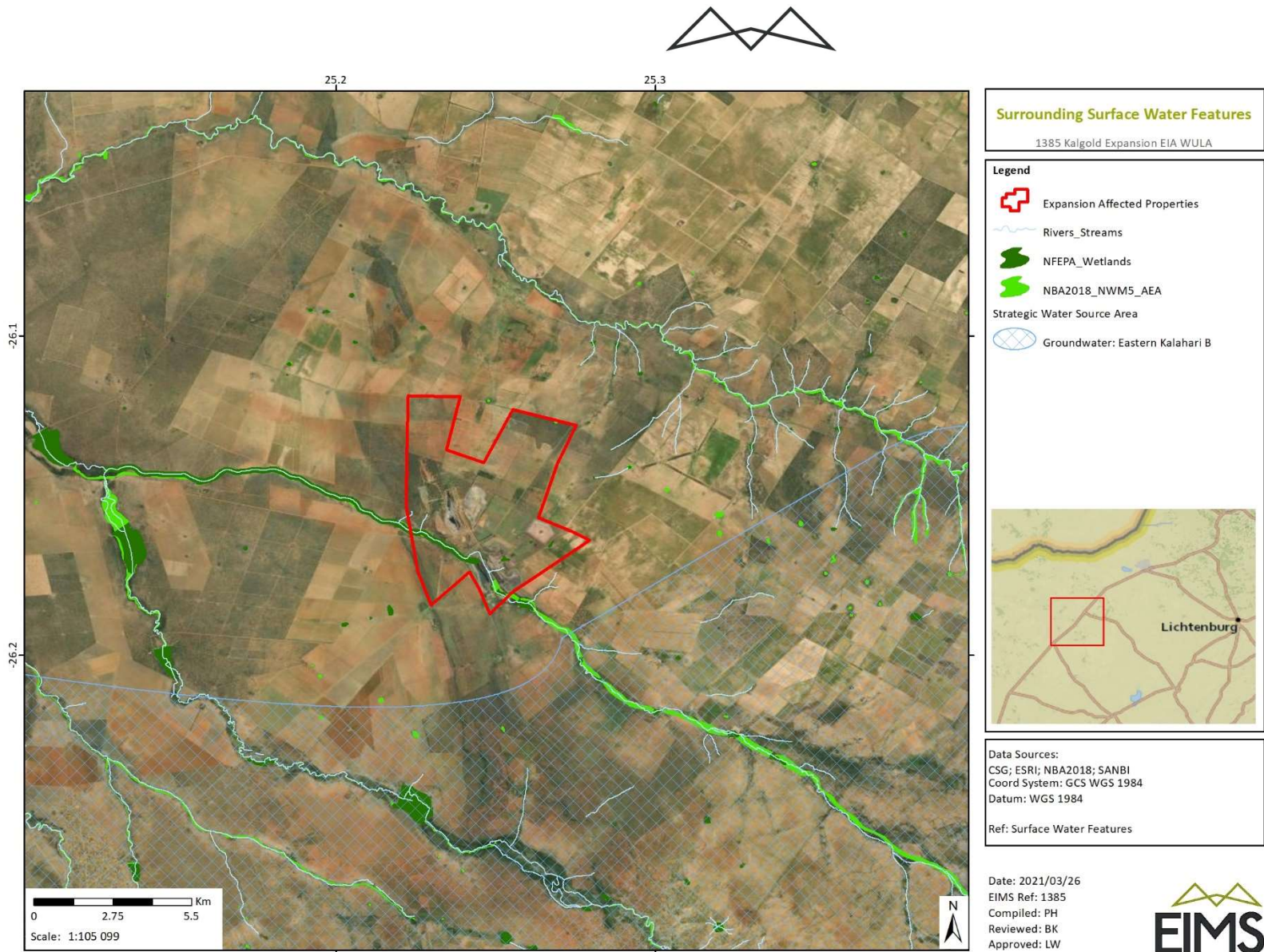


Figure 16: Summary of hydrological setting

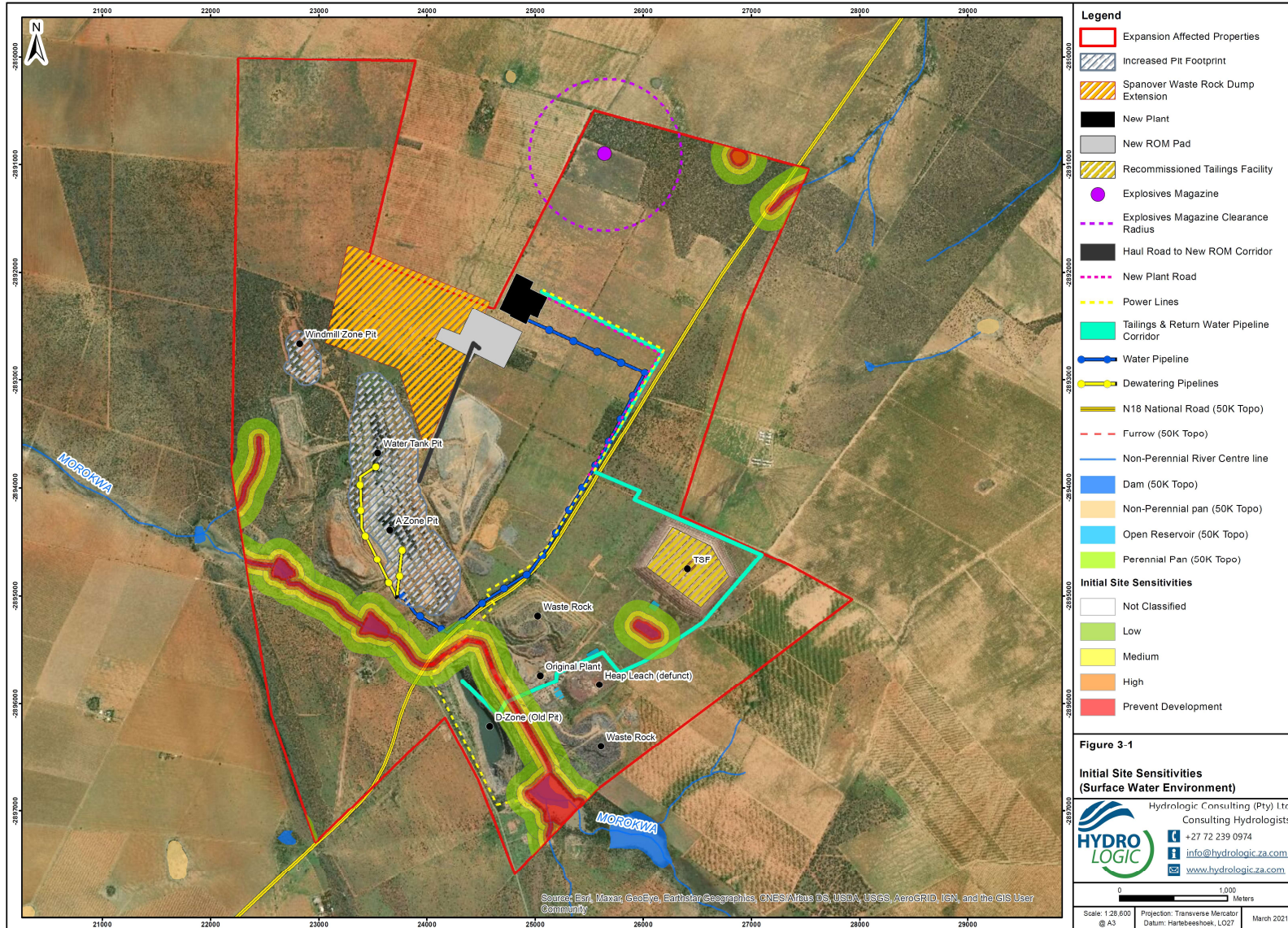


Figure 17. Initial surface water site identified site sensitives.



8.10 WETLANDS

A Freshwater Ecology scoping study (wetlands) was prepared by the Biodiversity Company in October 2020 and updated in February 2021, the findings of the baseline assessment are presented in this section with the full report presented in Appendix D.

The National Freshwater Ecosystem Priority Areas (Nel *et al.*, 2011) were used to determine the presence of NFEPA wetlands. One NFEPA wetland has been identified within the project area. This is illustrated in Figure 18.

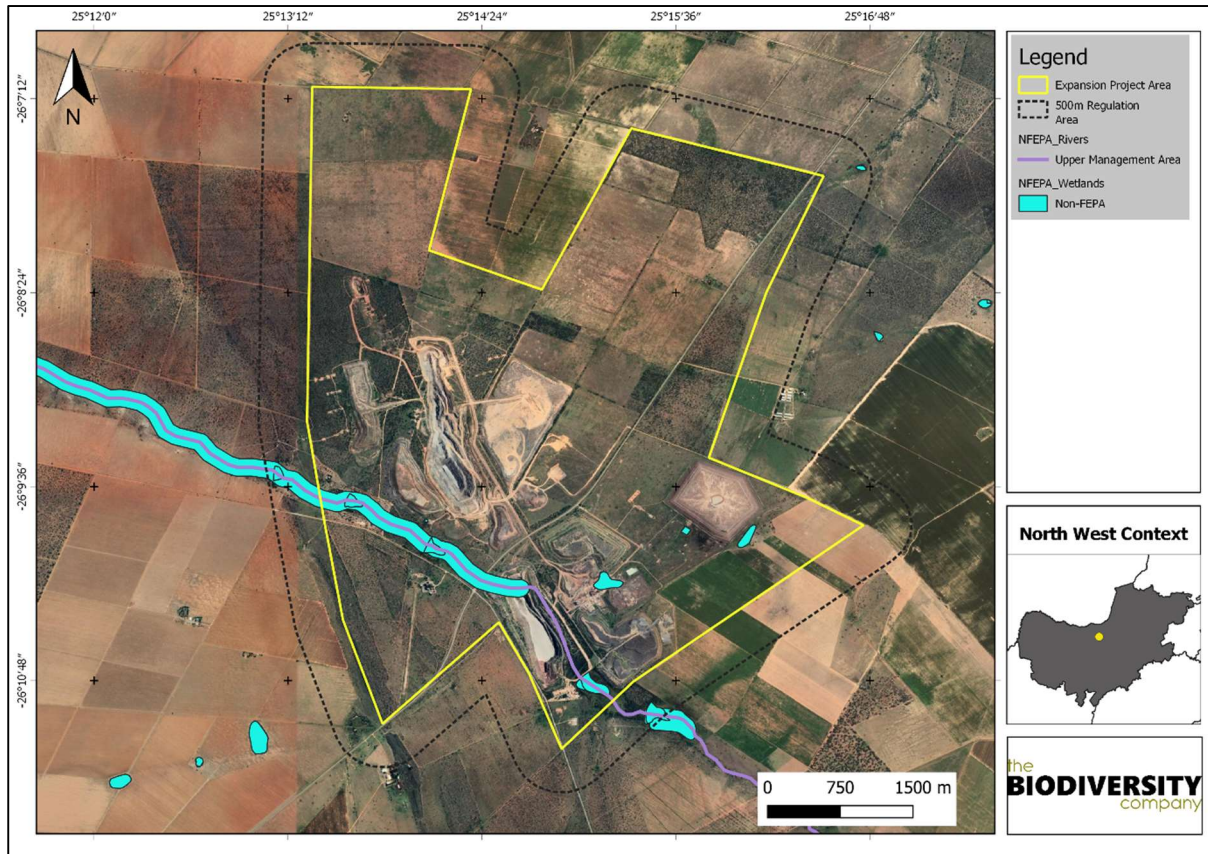


Figure 18: NFEPA wetlands identified within range of the proposed development.

According to the National Wetland Map 5 spatial data (Deventer *et al.* 2019), four natural wetland types within are located within the 500 m regulated area of the proposed project, with only a floodplain and seep being traversed by a proposed road and power line respectively (Figure 19). The threat status of these systems ranges from Least Concern to Critically Endangered. The protection level ranges from Not Protected to Poorly Protected. According to the Strategic Water Source Areas (SWSA) dataset the project area is 2.2 km from a SWSA.

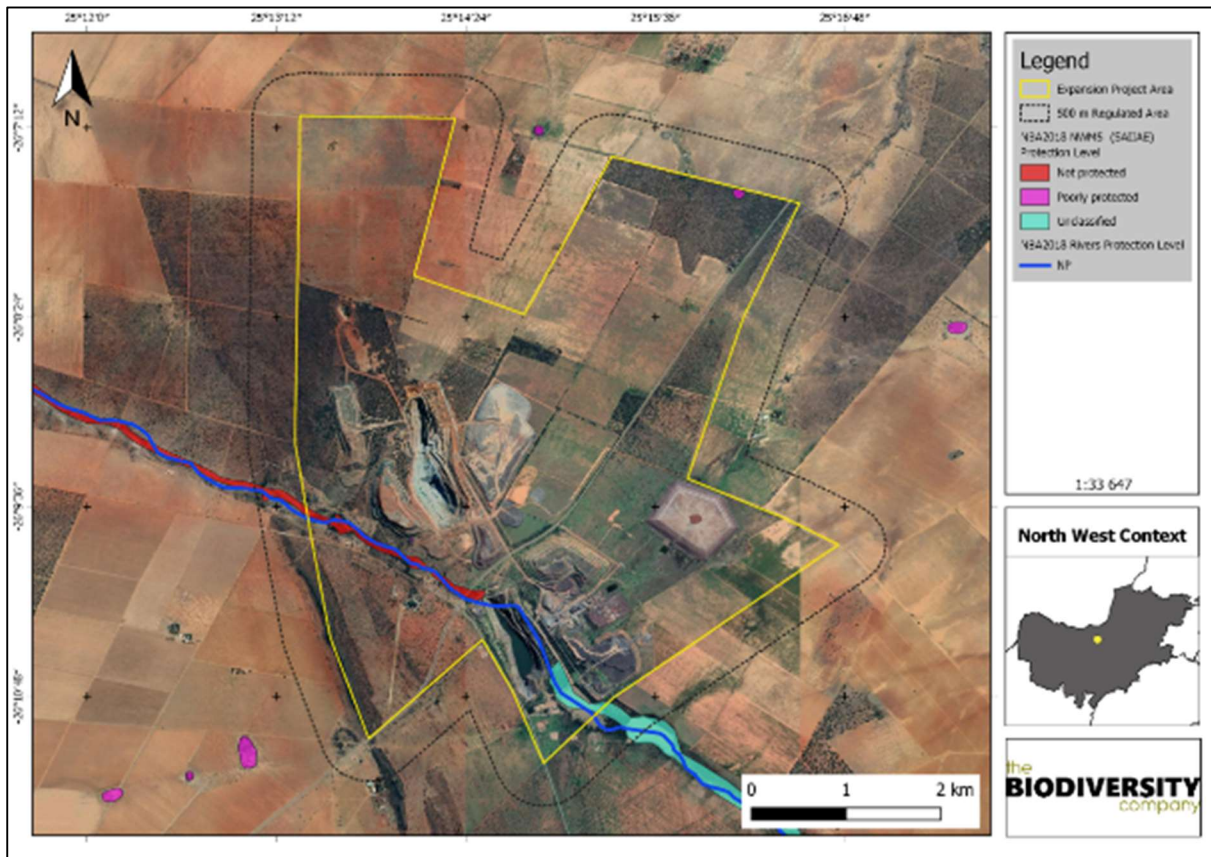


Figure 19: National Wetland Map 5

The study area considered in this assessment is located within the Southern Kalahari Freshwater Ecoregion (Abel et al., 2008). In comparison to river systems located north of this watercourse, the aquatic fauna of the considered ecoregion is “lacking in diversity” (Abel et al., 2008). This ecoregion is known to contain approximately 1-19 freshwater fish species of which 1-11 are known to be endemic. The rivers in this ecoregion are typically alkaline and turbid and flow briefly after rainfall. The majority of the aquatic habitats in this ecoregion are composed of endorheic pans.

Notable aquatic ecology in the overall River basin are the several endemic Cyprinid species such as *Labeo capensis* (Least Concern), *L. umbratus* (Least Concern), *Labeobarbus kimberleyensis* (Near Threatened), *Labeobarbus aeneus* (Least Concern) and the Rock Catlet, *Austroglanis sclateri* (Least Concern).

The project area is relatively flat in relief with a flow direction towards the lower lying water resources.

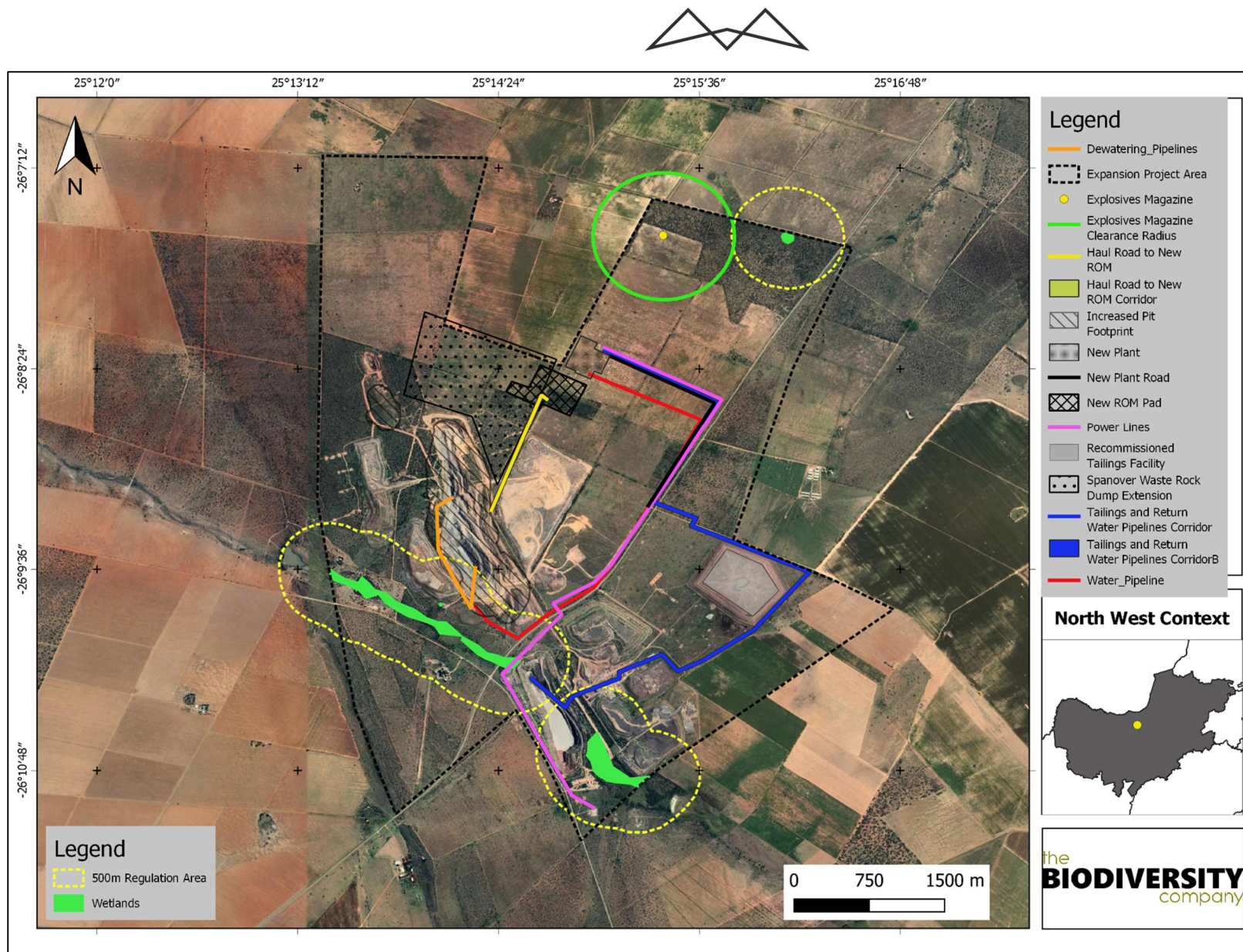


Figure 20: Infrastructure within a 500 m regulation area and surface flow direction



8.11 GEOHYDROLOGY (GROUNDWATER)

A geohydrology study was undertaken by M van Biljoen in October 2020 and updated in March 2021, the full report is presented in Appendix D. The geohydrology of the study area was assessed based on available mine monitoring data and previous studies and limited additional field work. The geohydrological setting and conceptual model of the study area is described according to the following criteria:

- Hydro census and borehole information;
- Aquifer type;
- Aquifer parameters;
- Groundwater gradients and flow; and
- Aquifer classification.

8.11.1 HYDROCENSUS

Auctus (2011) conducted a hydro census on all the neighbouring farms. The hydro census was conducted within an approximate radius of 5km around the mine. Twenty-nine boreholes were identified within this radius and included private as well as selected mine boreholes. The hydro census information is summarised in the groundwater report in Appendix D. It is important that the hydro census boreholes are shown in this assessment as some of them may be impacted on if contamination from the tailings deposition occur. Over the years Kalgold also drilled additional boreholes including several water supply and dewatering boreholes. Information from all available boreholes were utilised in understanding the geohydrological regime. Detailed hydro census results are presented in the groundwater report in Appendix D.

8.11.2 AQUIFER TYPE

The available information suggests the presence of the following aquifers in the modelled area, as illustrated in the schematic cross section in Figure 21 .

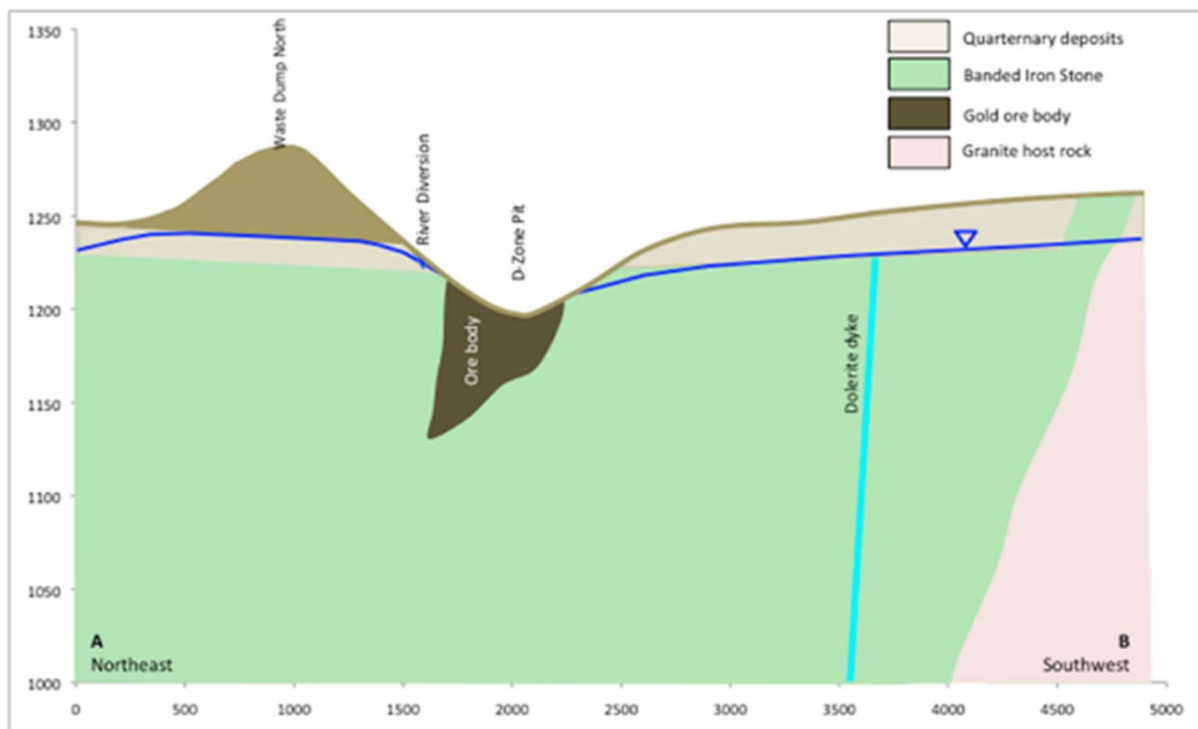


Figure 21: Schematic cross-section showing different aquifers



The following aquifers are present in the vicinity of Kalgold mine (Auctus, 2011):

- The quaternary Kalahari sand, which covers the project area, forms an intergranular, unconfined aquifer in the upper 30m of the geological succession. The deposit consists typically of sand and silt. The rate of recharge to the aquifer is normally below 1% of the Mean Annual Precipitation (MAP). It is however assumed, based on groundwater level information that the three boreholes with shallow groundwater levels of $\pm 10\text{m}$ (WB168, WB114 and KFBH15) are possibly drilled into this aquifer. A groundwater mound has potentially formed underneath the waste rock dump at the D-Zone Pit, which may result in a slightly elevated groundwater level in that area. In intergranular porous deposits, like the Kalahari sands, aquifer parameters are reasonably homogeneous. There is currently no aquifer parameter information available for this aquifer in the study area and literature-based values have therefore been used to quantify this aquifer. It is unclear whether this aquifer is laterally extensive over the project area, but the aquifer is probably recharged seasonally with rainwater and therefore could contribute to water make in the pits. If boreholes are used regionally to abstract groundwater from this aquifer, the yield per borehole is expected to be 0.10 – 0.50 litres per second (ℓ/s), which is low.
- A deeper fractured rock aquifer is formed by bedding planes, fractures and faults in the weathered and competent meta-sediments of the Kraaipan Greenstone Belt. In fractured rocks, the interconnected discontinuities are considered to be the main passage for groundwater flow and the solid rock blocks considered to be of very low permeability or impermeable. Despite the absence of geological logs, the aquifer characteristics obtained from the recently pumped boreholes are thought to represent this aquifer. Inherently, these types of aquifers are heterogeneous, as is evident from the pump test information, which indicates that the transmissivity in this aquifer varies between 0.90 and 346 m^2/day . The fractured rock aquifer will be recharged through rainwater infiltrating from the overlying intergranular aquifer or through direct recharge where the Banded Iron Formation (BIF) outcrops. The depth to groundwater in this aquifer is on average 25m, based on measurements in the monitoring boreholes thought not to be affected by mining or groundwater abstraction. Aquifer test information suggests that the aquifer could yield 0.50 – 3.0 ℓ/s , which is higher than that recorded for the intergranular Kalahari sand aquifer.

8.11.3 GROUNDWATER FLOW

Groundwater levels were measured as a first step to determine the regional groundwater gradients and flow directions. Typically, a linear relationship exists between the depth to groundwater and the topography, since groundwater normally drains under gravity towards streams and rivers. At Kalgold, however, a poor correlation (36%) exists, and it cannot be assumed that groundwater flow mimics the topography. The disturbance in this relationship is caused by the dewatering around Watertank and A-Zone pits, as well as the cone of depression around D-zone pit.

Contouring of the measured groundwater levels indicate that the regional groundwater flow is primarily towards the dewatering cone in the vicinity of the various mining pits (Figure 22).

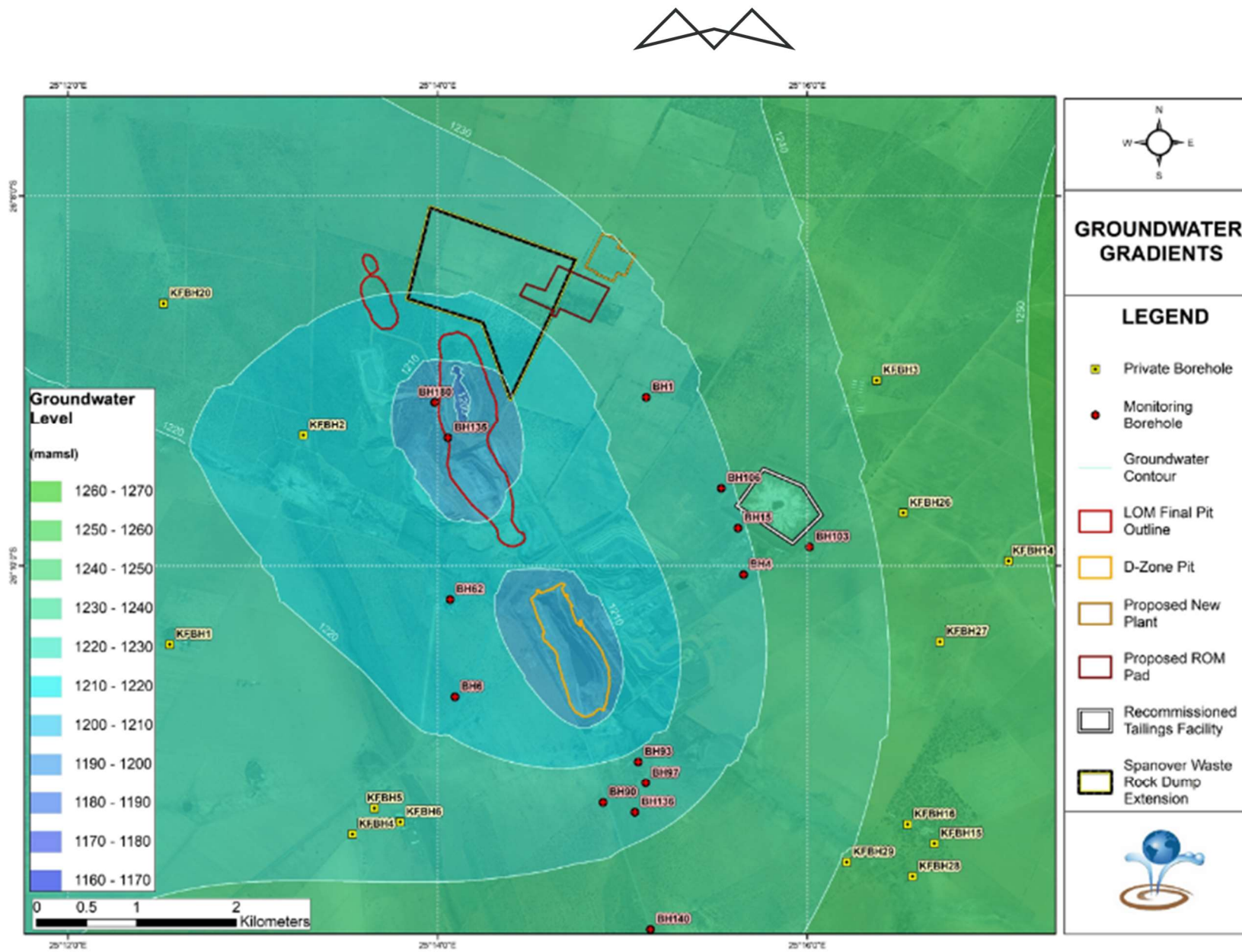


Figure 22: Regional groundwater gradient



8.11.4 AQUIFER CLASSIFICATION

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.

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 added together 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	Sole Source (6)	2	8	High

Since the fractured aquifer is the sole water supply to the farms in the region it is regarded as a sensitive and important aquifer that needs high level protection.

8.11.5 SIMULATED TOTAL GROUNDWATER INFLOW VOLUMES

The mining schedule estimated a Life of Mine (LOM) of approximately 10 years after July 2024. The ore tonnages peak at approximately 300 000 tons per month. Monthly tailings deposition from July 2024 will be 260 000 tons into D-Zone and 40 000 tons on the existing TSF that will be recommissioned as part of the expansion. This information formed the basis of assumption made in the geohydrological simulations.

The unavoidable inflow of groundwater into the opencast pits and the pumping of this water will have an impact on the groundwater levels near the mining operations. The based on the geohydrological simulations, dewatering impact is illustrated in Figure 23, which shows the expected groundwater drawdown cone at the end of mining (FY34).

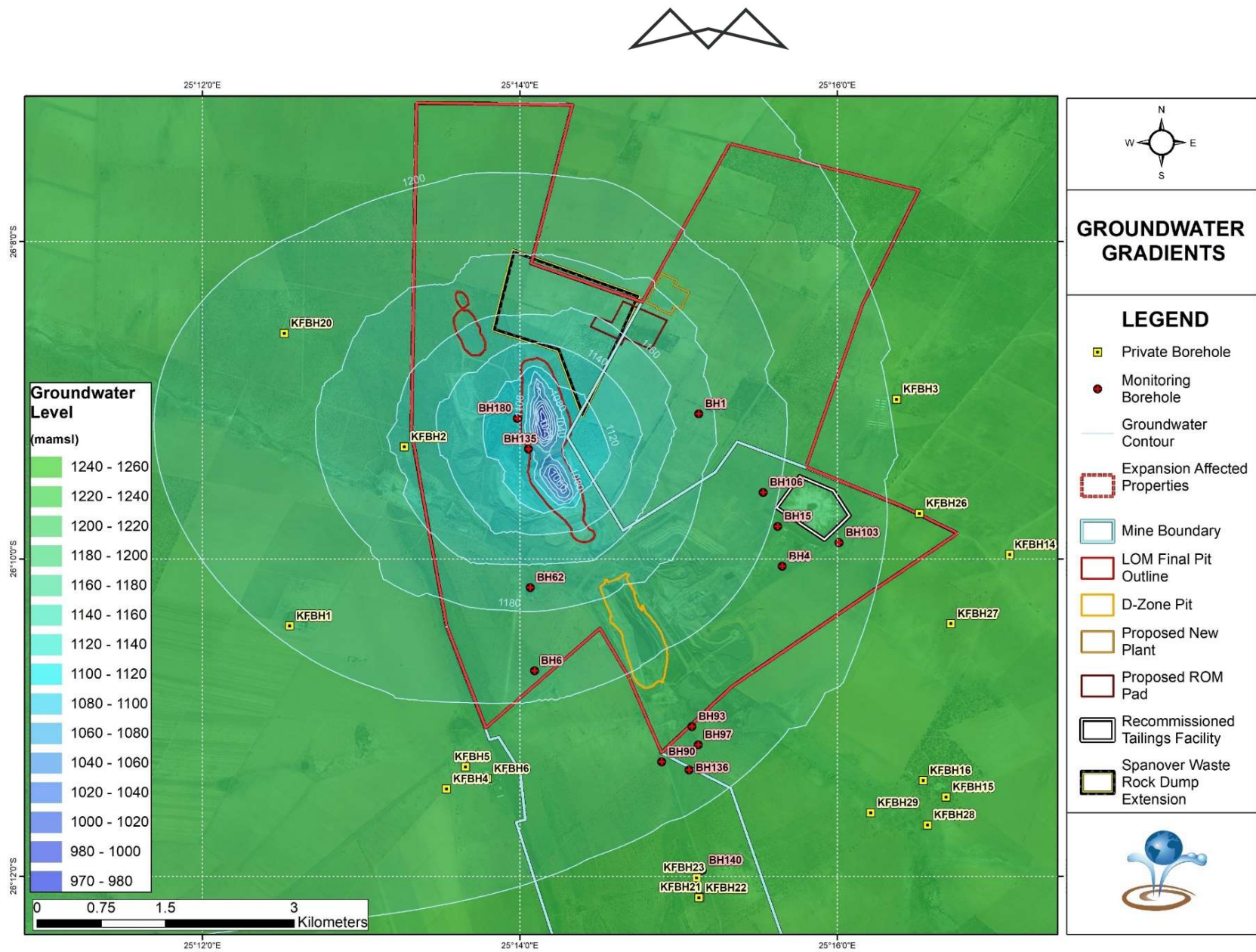


Figure 23: Simulated groundwater drawdown at the end of mining (2034)



There are four (4) private boreholes that may potentially be impacted by this dewatering (see Figure 23 for the locations referred to below). These include:

- KFBH1: Potential 21m drop in the groundwater level expected.
- KFBH2: Potential 57m drop in the groundwater level expected, which may cause this borehole to dry up.
- KFBH3: Potential 17m drop in the groundwater level expected.
- KFBH20: Potential 28m drop in the groundwater level expected.

It is recommended that these boreholes be included in the mine monitoring programme to verify the findings of this simulation. Borehole KFBH2 may need to be replaced if the simulations prove to be correct. It is further recommended that the groundwater levels in the “High and Medium Risk” categories are measured quarterly to verify model predictions and to act if necessary. The depths of these boreholes should also be confirmed.

During the operational phase of the mine the water will be pumped from the opencast operations. Post-closure this pumping will cease, and the groundwater level will recover. It is estimated that it will take approximately 25 years to recover to the average pre-mining groundwater level. Due to the high evaporation rates in the region the pits will always, if left open, act as a sink and groundwater flow will be towards the pits.

8.11.6 GROUNDWATER QUALITY IMPACTS

The contaminant plume migration from the Kalgold waste bodies were simulated with the numerical model. Total Dissolved Solids (TDS) was selected as a conservative tracer that represents the migration of contaminants through the aquifer. The simulated contaminant plume at the end of mining is shown in Figure 24.

The following post-closure alternatives were simulated:

- Alternative 1: In the first scenario the Watertank and A-Zone pits will be left open or backfilled with tailings material if required. If backfilled the groundwater levels will revert to pre-mining water levels. The WRD will be removed (sold as aggregate), and it is assumed that the TSF will be capped and vegetated. This option is currently the preferred option according to which the mining feasibility is planned.
- Alternative 2: In the second scenario the Watertank and A-Zone pits remain open. In this instance the pit will fill with water, which will remain below the regional groundwater level due to evaporation. The pit will act as a sink and will continue to draw groundwater towards it. The WRD's will remain, and it is assumed that the TSF will be capped and vegetated.

In each instance the two alternatives are compared to the do-nothing scenario in which the pits remain open, the WRD's will remain and the TSF will be uncapped. In other words, no rehabilitation measures will be implemented. The results of these simulations are presented in Figure 25 (Alternative 1) and Figure 26 (Alternative 2).

It is evident from the figures below that while the pits remain open after closure they continue to act as sinks, drawing water towards them and therefore containing any contamination within the pits. With the backfilling of the pits and the removal of the WRD, the impacted footprint areas clean-up after some time. In this scenario the contaminant plume from the TSF migrates towards D-zone as opposed to towards A-Zone if the pits remain open. If the TSF is capped the recharge rate reduces significantly, but the contamination currently in the groundwater continues to migrate down-gradient. It will, however, clean-up quicker than when it is not capped.

The simulations have indicated that in all instances the contaminant plumes are contained and irrespective of the rehabilitation option, the private groundwater users will not be impacted during mining or after closure.

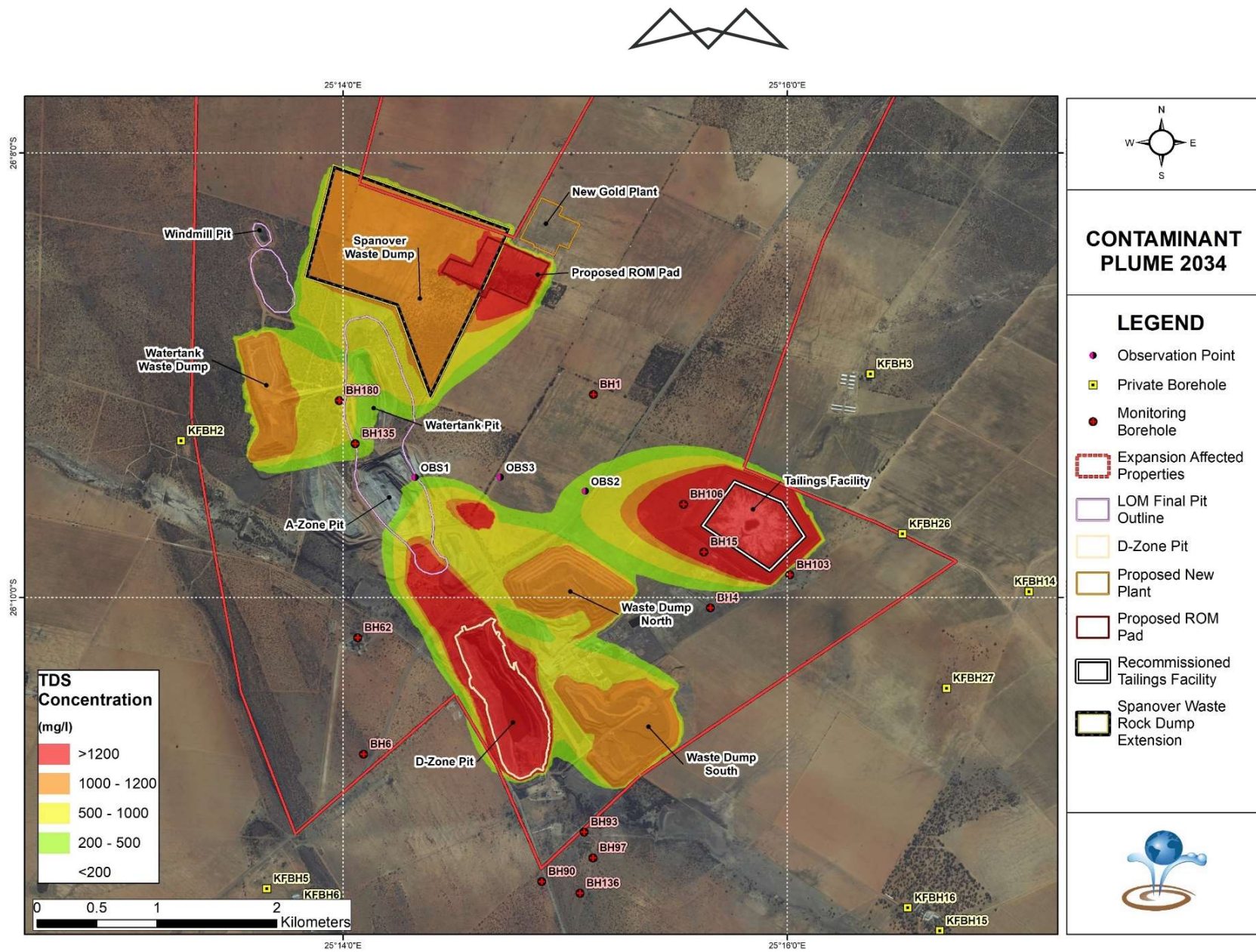


Figure 24: Simulated TDS plume at the end of mining (2034)

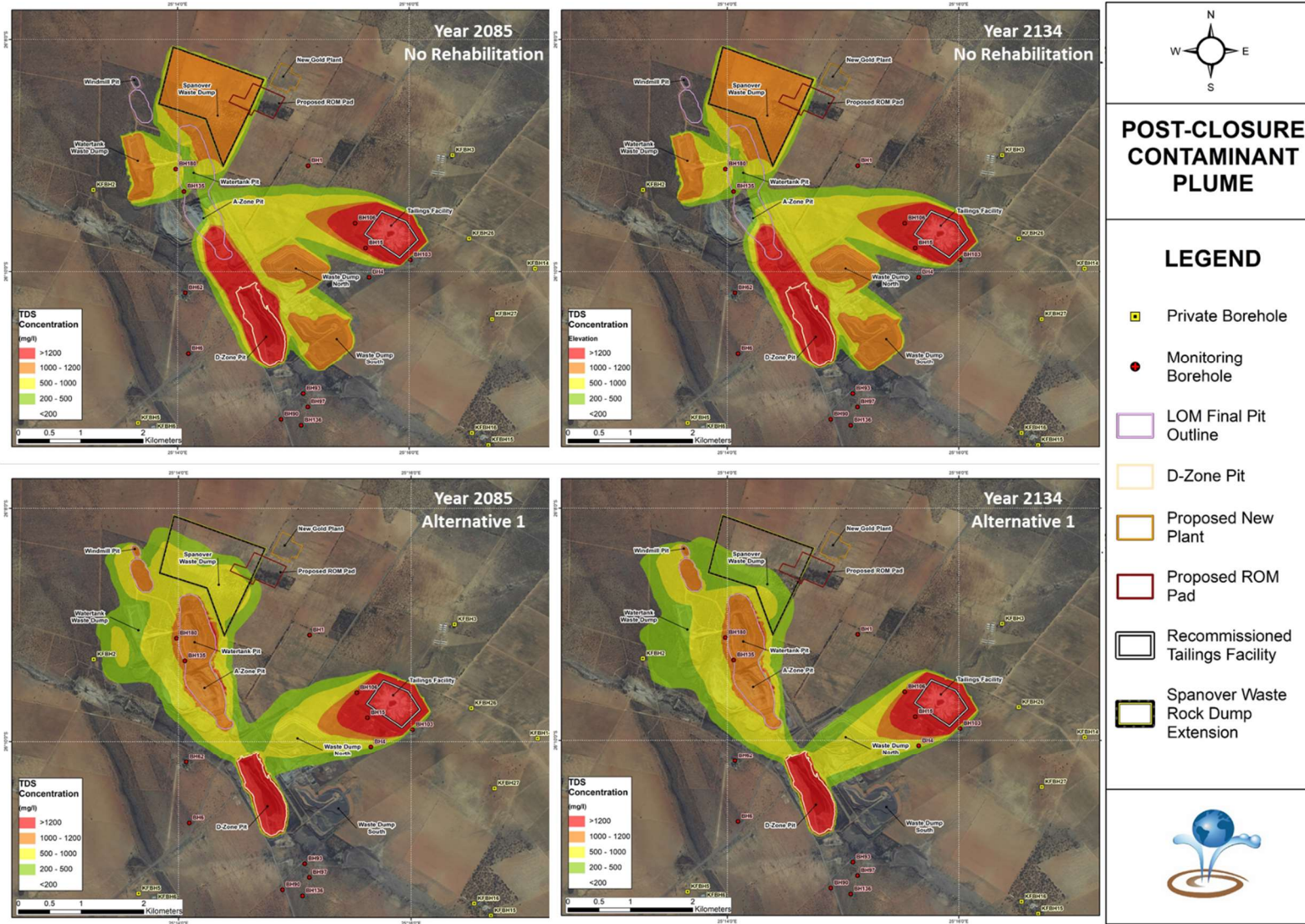


Figure 25: Comparison between contaminant plumes after 50 and 100 years – Post-closure alternative 1 (pits backfilled with waste rock and TSF capped)

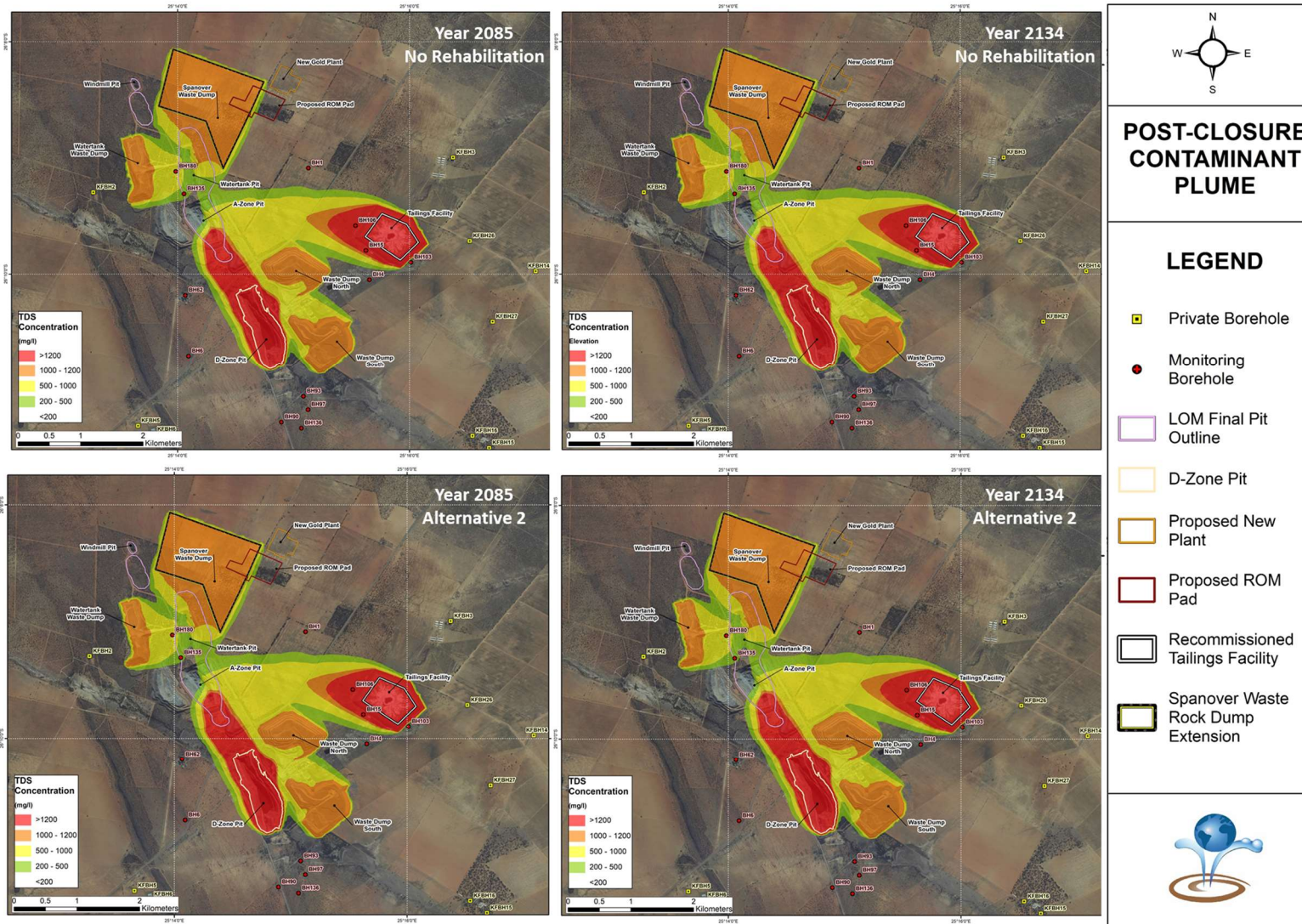


Figure 26: Comparison between contaminant plumes after 50 and 100 years – Post-closure alternative 2 (pits open, WRD’s remain and TSF capped).



8.12 AIR QUALITY

The air quality scoping study was undertaken by Airshed Planning Professionals (Pty) Ltd in October 2020 and updated in March 2021 and the findings of the study are presented in this section, full details are presented in Appendix D.

8.12.1 AIR QUALITY SENSITIVE RECEPTORS

Sensitive receptors in the surrounding area are identified as areas that may be impacted negatively due to emissions from the site. Examples of receptors include, but are not limited to, schools, shopping centres, hospitals, office blocks and residential areas. The sensitive receptors (within a 5km radius) identified in the area are presented in Table 14 .

Table 14: Sensitive receptors within a 5km radius

Receptor	Sensitive receptor description	Distance from site boundary (km)	Co-ordinates	
			Longitude	Latitude
R01	Neighbouring Farm	0.57	25.23152	-26.18991
R02	Neighbouring Farm	1.42	25.21098	-26.17402
R03	Neighbouring Farm	1.26	25.26321	-26.11359
R04	Neighbouring Farm	5.00	25.24546	-26.07454
R05	Neighbouring Farm	4.00	25.31348	-26.12076
R06	Neighbouring Farm	4.72	25.32589	-26.17147
R07	Neighbouring Farm	3.86	25.31043	-26.18452
R08	Neighbouring Farm	0.51	25.27014	-26.15222
R09	Neighbouring Farm	2.08	25.27640	-26.18993

8.12.2 LOCAL WIND FIELD

The vertical dispersion of pollution is largely a function of the wind field. The wind speed determines both the distance of downward transport and the rate of dilution of pollutants. The generation of mechanical turbulence is similarly a function of wind speed, in combination with surface roughness (Tiway & Colls, 2010).

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 orange 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. Calm conditions are periods when the wind speed was below 1 m/s. Values of 0 m/s could be when there is no wind; or, when there may be wind, but it is below the anemometer starting threshold (AST).

The period wind field and diurnal variability in the wind field are shown in

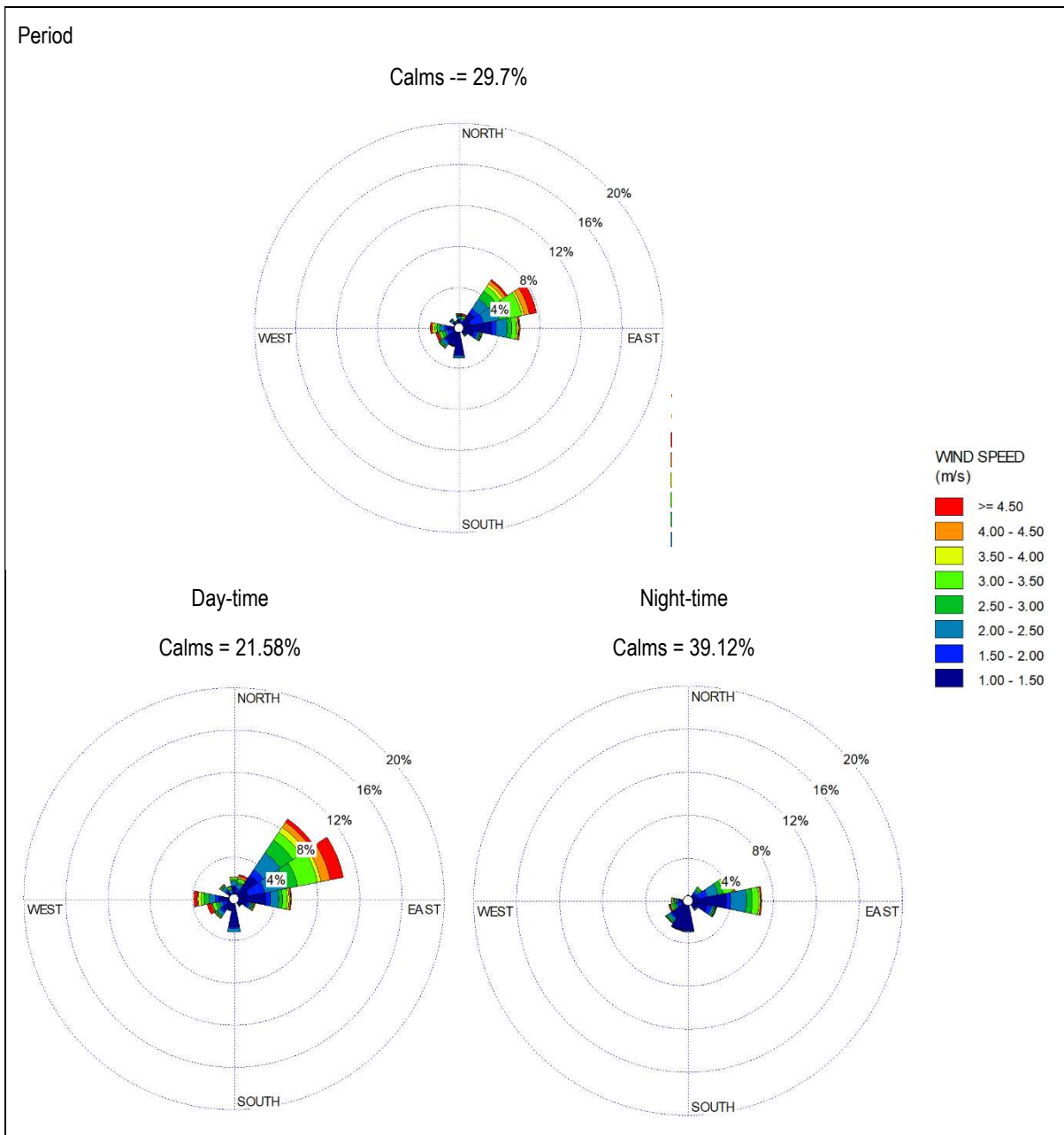


Figure 27, while the seasonal variations in the wind field are provided in

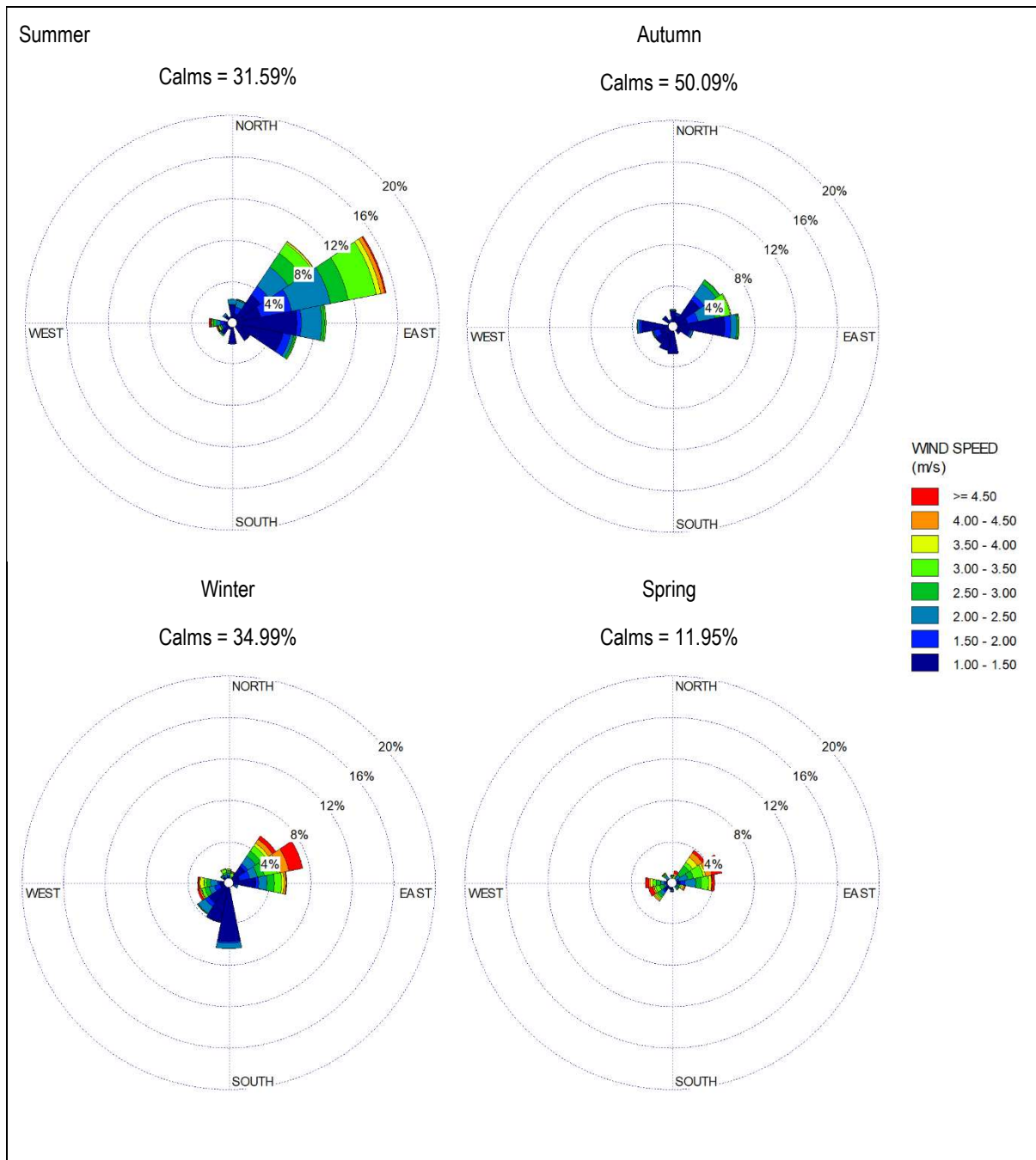


Figure 28 . The wind field is dominated by winds from the east-north-east, north-east and east. These directions were associated with the strongest winds. The period average wind speed is 1.08 m/s with calm winds occurring 29.7% of the time. The day-time wind rose shows a predominant east-north-easterly and north-easterly winds. The average wind speed during the day is 1.47 m/s with calm winds occurring 21.58% of the time. The night-time is characterised by a higher frequency of calm conditions (39.12%) and dominant winds originating from the east with and average wind speed of 0.68 m/s. Summer, winter, autumn and spring show similar wind direction profiles to the period average with an increase in southerly winds during Winter. The winds speeds are mostly lowest during Autumn and Winter; however, there are high frequency of winds above 4 m/s during Winter.

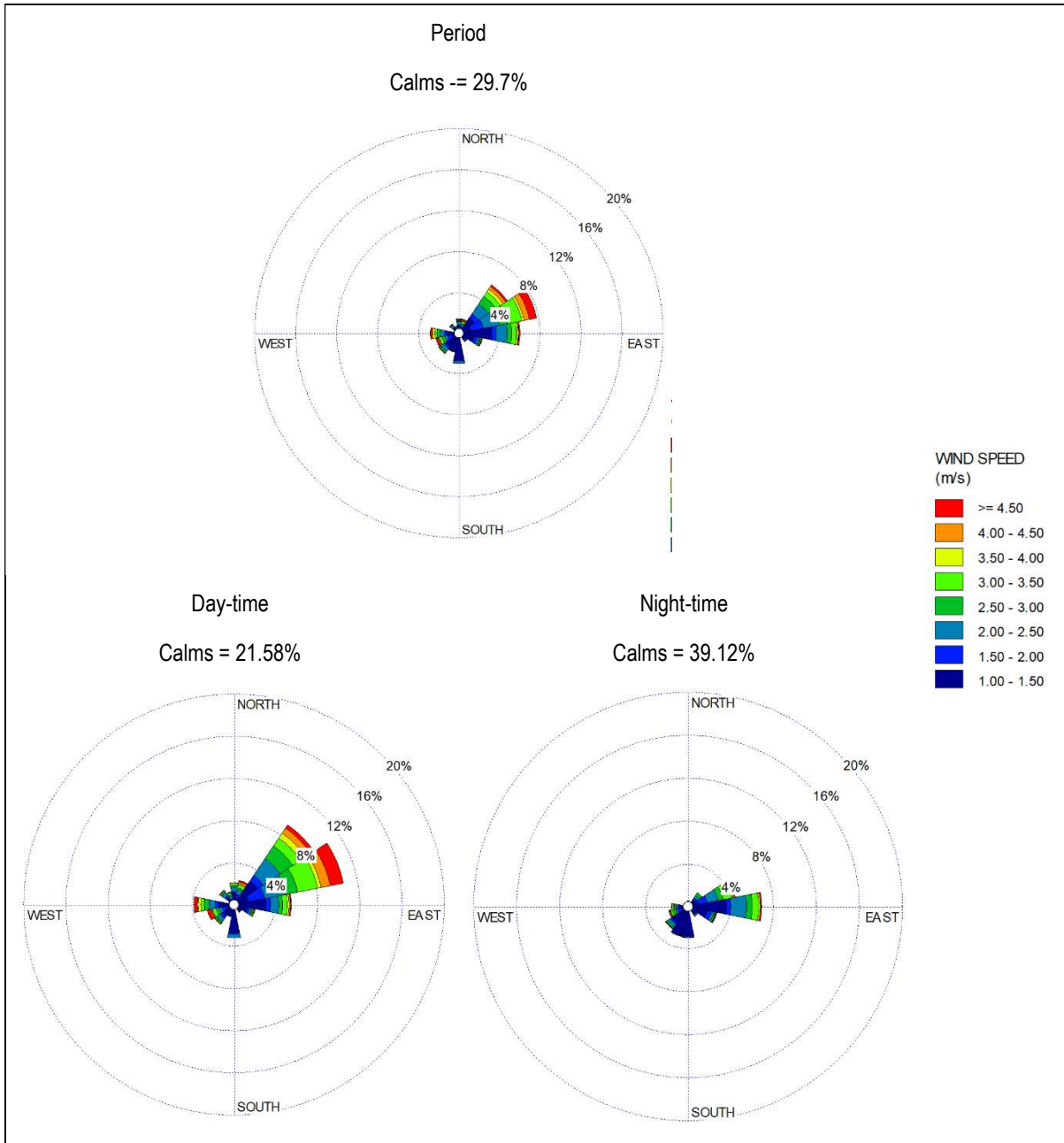


Figure 27: Period, day- and night-time wind roses (Harmony Kalgold Station August 2019 – September 2020)

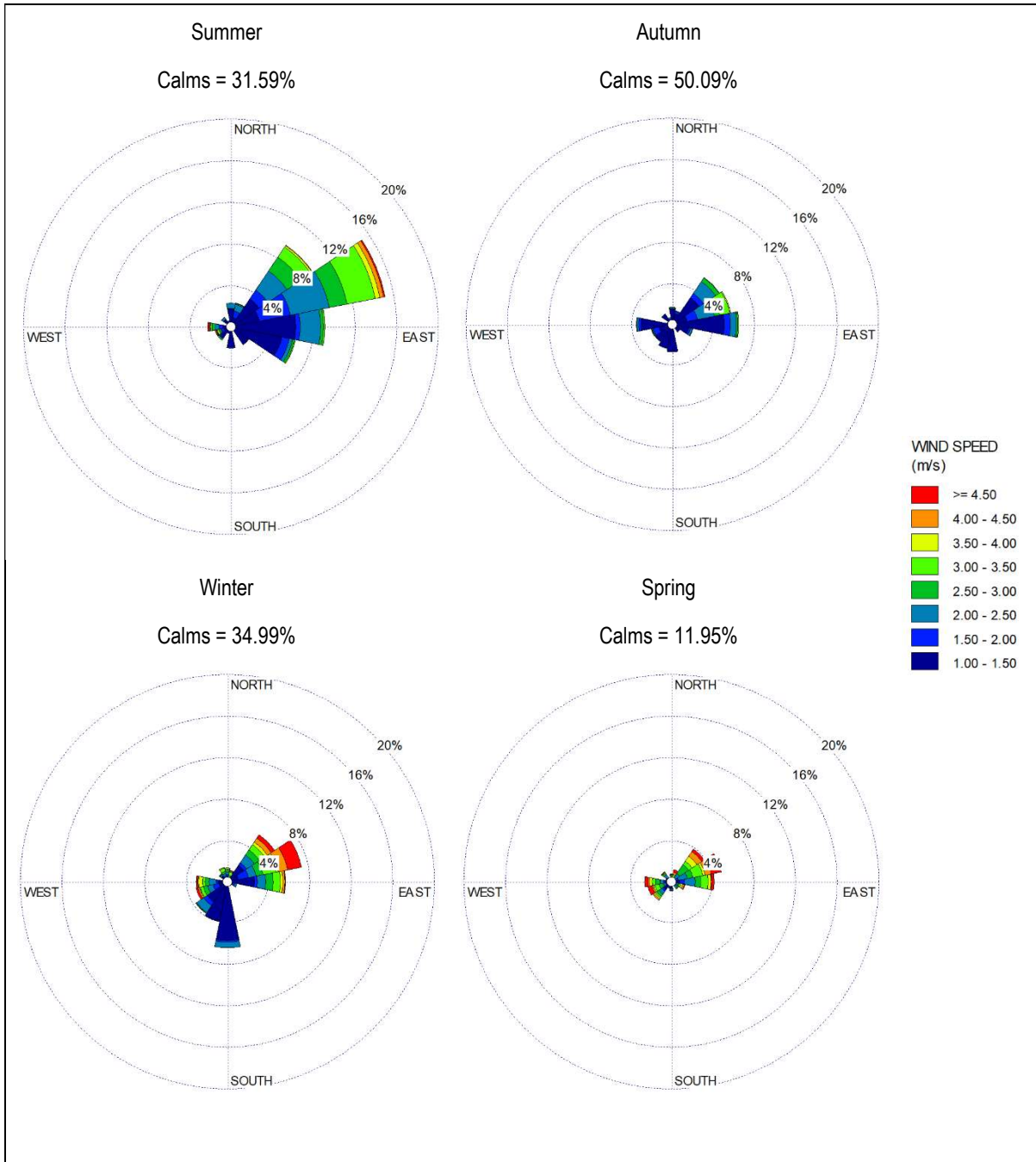


Figure 28: Seasonal wind roses (Harmony Kalgold Station August 2019 – September 2020)



9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 IMPACT ASSESSMENT METHODOLOGY

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

9.1.1 DETERMINATION OF ENVIRONMENTAL RISK

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

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

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

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 15 below.

Table 15: 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 (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction)



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, moderate improvement for +ve impacts)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, high improvement for +ve impacts)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts)
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 16.

Table 16: 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:

$$ER = C \times P$$

Table 17: 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 18.

Table 18: Significance Classes.

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

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

9.1.2 IMPACT PRIORITISATION

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

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

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

Table 19: 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 19. The impact priority is therefore determined as follows:

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

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 20).

Table 20: Determination of Prioritisation Factor.

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

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high 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 21: Final Environmental Significance Rating.

Environmental Significance Rating	
Value	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).



Environmental Significance Rating	
$\geq 9 < 17$	Medium positive (i.e. where the impact could influence the decision to develop in the area).
≥ 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

Potential environmental impacts were identified during the Scoping phase. These impacts were identified by the EAP, the appointed specialists, as well as information sort or received from the public. Table 22 provides the list of preliminary impacts identified during scoping, some of which will be further assessed in the EIA phase.

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 22: Identified environmental impacts

Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
Site Preparation (Planning)	<ul style="list-style-type: none"> • Vegetation clearance • Removal of any existing on site infrastructure • Planned placement of infrastructure • Establishment of construction contractor area 	<ul style="list-style-type: none"> • Loss of land capability and agricultural potential 			
Human Resources Management (Planning)	<ul style="list-style-type: none"> • Employment / recruitment • I&AP consultations (where necessary) • Corporate Social Investment initiatives • Skills development programmes • Environmental awareness training • Integration with municipalities' strategic long-term planning 				
Earthworks (Construction)	<ul style="list-style-type: none"> • Cleaning, grubbing and bulldozing • Removal of building waste and cleared vegetation • Digging trenches and foundations • Establishing stormwater 	<ul style="list-style-type: none"> • Sedimentation of downstream drainage / watercourses • Hydrocarbon fuel spillage • Reduction of catchment yield • Flooding • Loss of land capability and agricultural potential • Loss of seepage (infiltration) areas 	<ul style="list-style-type: none"> • Alien vegetation infestation • Loss of, or impaired ecosystem services • Further loss and fragmentation of the vegetation community as well the destruction of a 	<ul style="list-style-type: none"> • Project-induced in-migration • Labour draw down from other sectors • Employment and income creation • Increased demand for housing and services 	<ul style="list-style-type: none"> • Impact on chance finds heritage resources



Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
	<ul style="list-style-type: none"> management measures 	<ul style="list-style-type: none"> Alteration to surface runoff flow volumes Alteration of patterns of flows Impaired water quality Increase in sediment inputs and turbidity Inputs of toxic organic contaminants Inputs of toxic heavy metal contaminants Erosion 	<ul style="list-style-type: none"> portion of a Vulnerable vegetation type Displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise) Loss of movement corridor that animals use to migrate between fragmented habitats Loss of fauna and flora (direct and indirect) Direct loss of wetlands 	<ul style="list-style-type: none"> Social disintegration and conflict Impact on farmsteads Net GGP impact Net employment impacts Fiscal income Economic development per capita Country and industry competitiveness Loss of agricultural land and production (change in land use) Need and desirability 	
Civil Works (Construction)	<ul style="list-style-type: none"> Establishment of infrastructure and services Mixing of concrete and concrete works Establishment of general waste area Access control and security General site management 	<ul style="list-style-type: none"> Sedimentation of downstream drainage/watercourses Hydrocarbon fuel spillage Reduction of catchment yield Flooding of proposed infrastructures Loss of land capability Loss of surface roughness Loss of seepage (infiltration) areas Alteration to surface runoff flow volumes 	<ul style="list-style-type: none"> Alien vegetation infestation Loss of, or impaired ecosystem services Further loss and fragmentation of the vegetation community as well the destruction of a portion of a Vulnerable vegetation type 	<ul style="list-style-type: none"> Project-induced in-migration Labour draw down from other sectors Employment and income creation Increased demand for housing and services Social disintegration and conflict 	<ul style="list-style-type: none"> Impact on chance finds heritage resources



Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
		<ul style="list-style-type: none"> • Alteration of patterns of flows (increased flood peaks) • Impaired water quality • Increase in sediment inputs & turbidity • Inputs of contaminants • Erosion • Decline in air quality 	<ul style="list-style-type: none"> • Displacement, direct mortalities and disturbance of faunal community (including multiple threatened species) due to habitat loss and disturbances (such as dust and noise) • Loss of movement corridor that animals use to migrate between fragmented habitats 	<ul style="list-style-type: none"> • Dewatering of aquifer leading to reduction in water supply • Change of character • Impact on urban edge • Impact on farmsteads • Impact on local roads • Net GGP impact • Net employment impacts • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability 	
Operation	<ul style="list-style-type: none"> • Tailings transport • Processing • Milling • Deposition of tailings • Ore transport • Soil management • Water management • Concurrent rehabilitation 	<ul style="list-style-type: none"> • Sedimentation/pollution of downstream drainage/watercourse • Flooding of proposed infrastructures • Loss of land capability • Direct loss of wetlands • Loss of, or impaired ecosystem services • Loss of seepage (infiltration) areas • Loss of aquifers (and recharge) 		<ul style="list-style-type: none"> • Tax income • Employment and income creation • Conversion of land use • Social investment in the local community • Net GGP impact • Net employment impacts • Fiscal income 	



Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
		<ul style="list-style-type: none"> • Alteration to surface runoff flow volumes • Alteration of patterns of flows (increased flood peaks) • Impaired water quality • Increase in sediment inputs & turbidity • Increased nutrient inputs • Inputs of contaminants • Alien vegetation infestation • Erosion • Decline in air quality 		<ul style="list-style-type: none"> • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability 	
Infrastructure Removal (Decommissioning)	<ul style="list-style-type: none"> • Safety control 	<ul style="list-style-type: none"> • Siltation of water resources • Loss of land capability • Decline in air quality 		<ul style="list-style-type: none"> • Net GGP impact • Net employment impacts • Fiscal income • Economic development per capita • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability 	
Rehabilitation (Closure)	<ul style="list-style-type: none"> • Slope stabilisation • Erosion control • Landscaping • Replacing topsoil • Removal of alien/invasive vegetation • Re-vegetation 	<ul style="list-style-type: none"> • Migration of residual contamination after rehabilitation • Siltation of water resources • Decline in air quality 		<ul style="list-style-type: none"> • Net GGP impact • Net employment impacts • Forex savings • Fiscal income • Economic development per capita 	



Main Activity/ Action/ Process	Ancillary Activity	Geo-physical (geology, topography, air, water, etc.)	Biological	Socio-economic	Heritage and Cultural
	<ul style="list-style-type: none"> • Restoration of natural drainage patterns • Remediation of ground and surface water • Rehabilitation of external roads • Initiate maintenance and aftercare program 			<ul style="list-style-type: none"> • Black economic transformation • Country and industry competitiveness • Alternative land-use • Need and desirability 	
Maintenance (Post-closure)	<ul style="list-style-type: none"> • Environmental aspect monitoring • Monitoring of rehabilitation 	<ul style="list-style-type: none"> • Contamination of water resources 			



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 23 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.



Table 23: Preliminary impact assessment.

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
1	Potential impact on human health from increased pollutant concentrations	Construction	-6	-3	Non-compliance of PM _{2.5} , PM ₁₀ , SO ₂ , NO _x or CO concentrations with the relevant NAAQS could result in human health impacts and impacts on vegetation.	To be assessed during the EIA
		Operation	-9.75	-8.25		
		Closure	-1.25	-1.25		
2	Increased nuisance dust fall rates	Construction	-3.5	-1.25	Non-compliance of PM _{2.5} , PM ₁₀ , SO ₂ , NO _x or CO concentrations with the relevant NAAQS could result in human health impacts and impacts on vegetation	To be assessed during the EIA
		Operation	-8.25	-7.5		
		Closure	-1.25	-1.25		
3	Potential impact on vegetation health from increased dust fall rates and pollutant concentrations	Construction	-3.5	-1.25	Non-compliance of PM _{2.5} , PM ₁₀ , SO ₂ , NO _x or CO concentrations with the relevant NAAQS could result in human health impacts and impacts on vegetation.	To be assessed during the EIA
		Operation	-9	-8.25		
		Closure	-1.25	-1.25		
4	Habitat modification from Pit Extension, TSF Extension and Associated infrastructure	Construction	-8.28	-1.75	In an effort to make terrain available for the proposed infrastructure associated with the mining expansion, there will be clearing of land which will strip topsoil and also remove vegetation, subsequently leaving bare ground. There is likely to be an increase in run-off volumes and velocity reporting to the water resources, which will be susceptible to erosion. The erosion of these system will alter the structure and geomorphology to some extent. Further to this, sedimentation of the systems will also contribute to altered habitat integrity, and possibly the loss of freshwater habitats	To be assessed during the EIA
		Operation	-9	-2		
		Closure Phase	-5.5	-2.75		
5	Habitat modification from Production Plant and Associated infrastructure	Construction	-8.28	-1.75		To be assessed during the EIA
		Operation	-9	-2		
		Closure Phase	-5.5	-2.75		
6	Habitat modification from New Magazine and Associated infrastructure	Construction	-8.28	-1.75		To be assessed during the EIA
		Operation	-9	-2.25		
		Closure Phase	-5.5	-2.75		
7	Habitat modification from Spanover WRD Expansion and Associated infrastructure	Construction	-8.28	-1.75		To be assessed during the EIA
		Operation	-9	-2.25		
		Closure Phase	-5.5	-6.5		
8	Water quality modification from Pit Extension, TSF Extension and Associated infrastructure	Construction	-9	-1.75	During the construction phase of the extension there will be a multitude of materials such as concretes and hydrocarbons which if not appropriately contained, cleaned or managed will potentially be washed/spilled into the watercourse and may have	To be assessed during the EIA
		Operation	-16	-6.5		
		Closure Phase	-7	-6.5		
9		Construction	-9	-1.75		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment	
	Water quality modification from Production Plant and Associated infrastructure	Operation	-16	-6.5	serious potential to impact on the water quality and chemistry of the system. The new infrastructure possesses the potential for spillages and seepages of dirty water into the watercourse. While this may not be intentional, they pose a serious risk to the watercourse as they can significantly alter the water quality and chemistry of the watercourse	To be assessed during the EIA	
		Closure Phase	-7	-6.5			
10	Water quality modification from New Magazine and Associated infrastructure	Construction	-9	-1.75		To be assessed during the EIA	
		Operation	-16	-6.5			
		Closure Phase	-7	-6.5			
11	Water quality modification from Spanover WRD Expansion and Associated infrastructure	Construction	-9	-1.75		To be assessed during the EIA	
		Operation	-16	-6.5			
		Closure Phase	-7	-6.5			
12	Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.	Planning	-14	-3		As more vehicles will be driving in the area to survey various components of the project, the wildlife will be disturbed. The possible use of light machinery can also lead to the trampling of both vegetation and faunal species.	To be assessed during the EIA
13	Destruction, further loss and fragmentation of the vegetation community	Construction/ Operation	-16	-6		The vegetation communities are classed as Vulnerable (VU), through site clearing, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion.	To be assessed during the EIA
14	Introduction of alien species, especially plants	Construction/ Operation	-13	-4	The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive - and pest species. Overall, the fauna assemblage will be changed.	To be assessed during the EIA	
15	Erosion due to storm water runoff and wind	Construction/ Operation	-14	-6.75	Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat.	To be assessed during the EIA	
16	Displacement of faunal community due to habitat loss, direct mortalities and	Construction/ Operation	-15	-6	Faunal community will be influenced in a number of ways, including the loss of habitat, disturbances that will either make them move out of the area if possible	To be assessed during the EIA	



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
	disturbance (road collisions, noise, light, dust, rock chips, bird Power line collisions, vibration and poaching).				or have to adapt and possible deaths due to physical harm or indirect harm.	
17	Environmental pollution due to water/ mine drainage runoff potential leaks, discharges, pollutant and storage leaching into the surrounding environment	Construction/ Operation	-16	-4	Hydrocarbons leaching into the surrounding area will result in the loss of usable water resources. This will also result in the contamination of the topsoil and reduce the likelihood of successful rehabilitation of an area	To be assessed during the EIA
18	Continued encroachment of an indigenous and VU vegetation community by alien invasive plant species as well as erosion due to disturbed soils	Closure Phase	-15	-6	The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss.	To be assessed during the EIA
19	Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Closure Phase	-15	-6	During the decommissioning phase infrastructure will now be broken down, removed and disturbed. As the infrastructure is being removed this will disrupt the ecosystem.	To be assessed during the EIA
20	Destruction, further loss and fragmentation of the high agricultural land use – TSP, Pit, WRD	Construction	-20	-12	The proposed expansion will result in the stripping of topsoil and alterations to the existing land uses. These changes are likely to result in changes in the land use from agricultural to mining (or transformed). The proposed activities will impact on areas expected to be high agricultural potential, with some aspects affecting medium to low sensitivity areas. It is possible that suitable agricultural land could become	To be assessed during the EIA
21	Destruction, further loss and fragmentation of the high agricultural land use - Linear servitudes and Magazine	Construction	-18.75	-12		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
22	Destruction, further loss and fragmentation of the high agricultural land use – Plants	Construction	-20	-12	fragmented, resulting in these smaller portions no longer being deemed feasible to farm	
23	Destruction, further loss and fragmentation of the high agricultural land use	Operation	-16	-9	The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss.	To be assessed during the EIA
24	Continued destruction, further loss and fragmentation of the high agricultural land use	Decommissioning and Rehab Phase	-13	-8.25		
25	Destruction, further loss and fragmentation of the high agricultural land use	Closure Phase	-12	-8.25		
26	Erosion of Soils	Construction	-11	-2.5	Eroded soils have the potential to cause sedimentation of downstream watercourses. The construction/expansion of infrastructure will lead to new areas being disturbed, resulting in the potential for soil erosion to occur during times of rainfall, while the decommissioning of this infrastructure will result in the same. If not mitigated, erosion could continue during the operational phase, although it is expected soils would settle to a degree, reducing the potential volume of erosion for any given rainfall event. The rehab/closure phase may have an overall positive impact on any existing erosion without formal erosion mitigation in place, although there could also be some increase in erosion due to earthworks. Potential erosion is exacerbated by the moderately high runoff potential of soils in parts of the site, which would cause a higher proportion of rainfall to be converted into runoff, thereby increasing the runoff's potential erosivity, although the limited surface area to be disturbed will limit the overall erosion of soils on site during all project phases.	To be assessed during the EIA
		Operation	-8.25	-2.5		
		Decommissioning	-11	-2.5		
		Closure	-11	-2.5		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
					Disturbed areas should consequently be stabilised with erosion control methods used where stabilisation is not possible. A rehabilitation plan for the site inclusive of topsoil replacement, a re-vegetation strategy and maintenance/aftercare and should be developed for disturbed areas	
27	Pollutants entering surface water	Construction	-17.5	-6.5	Operation of earth moving machinery or maintenance of vehicles on site during construction, operation, decommissioning and rehab/closure (including the possible storage or handling of hydrocarbons) poses a potential source of hydrocarbon contamination with regards to the surface water environment. An emergency response plan for unforeseen hydrocarbon spills should be developed while the existing surface water monitoring should be reviewed to ensure adequate coverage of the proposed expansion. A storm water management plan is a necessary part of the development of the expansion (as per GN704) and will form an integral mitigation measure with regards to the management of dirty areas.	To be assessed during the EIA
		Operation	-20	-7		
		Decommissioning	-17.5	-6.5		
		Closure	-13	-6.5		
28	Decrease surface runoff	Construction	-13	-13	An increase in runoff could be expected due to the proposed construction of infrastructure which will increase impermeable hardstanding and compaction from movement of machinery and use of laydown areas. The necessary introduction of a storm water management plan will, however, result in containment of much of the aforementioned area, thereby effectively decreasing runoff from the site. A decrease in runoff is a typical impact associated with the containment of dirty areas on mines and the mitigation of this impact is often not practical or	To be assessed during the EIA
		Operation	-14	-14		
		Decommissioning	-14	-14		
		Closure	-12	-12		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
					possible with a reduction in mean annual runoff an expected outcome	
29	Flood Risk (River)	Construction	-5.5	-2.75	<p>Flood risk is an impact to the proposed Kalgold Expansion Project and not the environment as with the other impacts identified in this report. This risk is expected to be present during the construction, operational and decommissioning phases due to the existence of infrastructure/works that could be flooded and the presence of personnel who might be caught in flood waters.</p> <p>Some proposed infrastructure (tailings & return water pipeline and power lines) crosses the Morokwa River and have a certain flood risk (on the basis of intersection with a watercourse). This infrastructure, however, likely has a low flood vulnerability thereby limiting the potential impact of flooding. Other infrastructure located near a watercourse (specifically the Morokwa River) may have a flood risk, however, without quantitative flood modelling, an assessment of this flood risk is not possible at this time. Nevertheless, the greatest impact from flooding is likely to opencast pits near a watercourse, such as D-Zone. Flood risk will be assessed further in EIA phase given current uncertainty regarding both previous modelling and the relevance of infrastructure (due to the consideration with regards to existing works/infrastructure that is consequently not covered by this assessment of the proposed expansion.</p>	To be assessed during the EIA
		Operation	-5.5	-2.75		
		Decommissioning	-5.5	-2.75		
30	Damage/destruction of unidentified heritage finds (Heritage resources)	Planning	-6	-2.5	Damage/destruction of unidentified heritage finds.	To be assessed during the EIA
		Construction	-3	-5.5		
		Operation	-3	-5.5		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
		Decommissioning	-3	-5.5		
		Closure	-3	-5.5		
31	Damage/destruction of unidentified heritage finds (Burial grounds and graves)	Planning	-11.25	-6.5		
		Construction	-11.25	-6.5		
		Operation	-11.25	-6.5		
		Decommissioning	-1	-1		
		Closure	-1	-1		
32	Damage/destruction of possible finds (Palaeontology)	Planning	-1	-1		
		Construction	-2	-1		
		Operation	-2	-4		
		Decommissioning	-1	-1		
		Rehabilitation	-1	-1		
33	Employment creation	Construction	4.5	9	During construction and operation, the local area is likely to experience an economic injection in the form of employment creation, taxes, CSI and SLP spend, and increased business and consumer spending.	To be assessed during the EIA
		Operation	7.5	15		
34	Diversification of economic activities	Operation	5	9		
35	Increased tax income	Operation	11	13		
36	Dependency on a single industry	Operation	-10.5	-8.25		
37	Additional demand on limited resources	Construction	-10.5	-4.5		
38	Social Mobilisation	Construction	-14	-4.5		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
		Operation	-11	-4	<p>The expansion of Kalgold could change the natural and human capital landscape of the area. If not managed proactively through proper stakeholder engagement, it can lead to social mobilisation:</p> <ul style="list-style-type: none"> Local unemployed people could mobilise if they were under the impression that work was given to 'outsiders'. Local farmers feel unheard when mining developments continue unabated. They are likely to mobilise against the mine over 'higher order' issues that affect individuals but which they largely feel affect all of them – e.g., noise, dust, blasting effects, etc. 	To be assessed during the EIA
	Reduction in ground water levels (Option 2: Watertank and A-Zone pits remain open)	Operation	-7.5	-5.25	<p>This risk is essentially a short-term risk. Continuous monitoring of the groundwater levels in the monitoring boreholes as well as in selected private boreholes is recommended. This will provide early warning if private users are to be impacted on, in which case the mine should supply these farmers with an alternative source until the groundwater levels recover. Alternative sources can include a new borehole or a water supply pipeline from the mine. The surface streams in the area are classified as losing streams. In other words, the groundwater does not contribute to the baseflow in the streams. Lowering of the groundwater level will therefore not impact on any of the streams.</p>	To be assessed during the EIA
		Decommissioning	-7.5	-5.25		
		Closure	-7.5	-2.5		
	Reduction in ground water levels (Option 1: Watertank and A-Zone pits backfilled with WRD)	Decommissioning	-7.5	-3.5	<p>This risk is regarded as a longer-term risk and two alternatives, as described above, were evaluated to mitigate this risk. The primary receptors that may be impacted are the private groundwater users. Due to the streams being losing streams any groundwater</p>	To be assessed during the EIA
		Closure	-7.5	-1.25		
	Contaminant Seepage from TSF (Option 2: Watertank and A-Zone pits remain open)	Operation	-12	-8.25	<p>This risk is regarded as a longer-term risk and two alternatives, as described above, were evaluated to mitigate this risk. The primary receptors that may be impacted are the private groundwater users. Due to the streams being losing streams any groundwater</p>	To be assessed during the EIA
		Decommissioning	-12	-1.5		
		Closure	-12	-4.5		



#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description	Further Assessment
					contamination is also not expected to impact on the streams.	
	Contaminant Seepage from TSF (Option 1: Watertank and A-Zone pits backfilled with WRD)	Decommissioning	-12	-8.25	This risk is regarded as a longer-term risk and two alternatives, as described above, were evaluated to mitigate this risk. The primary receptors that may be impacted are the private groundwater users. Due to the streams being losings streams any groundwater contamination is also not expected to impact on the streams	To be assessed during the EIA
		Closure	-12	-4.5		
	Contaminant Seepage from WRD (Option 2: Watertank and A-Zone pits remain open)	Operation	-9	-4.5	This risk is regarded as a longer-term risk and two alternatives, as described above, were evaluated to mitigate this risk. The primary receptors that may be impacted are the private groundwater users. Due to the streams being losings streams any groundwater contamination is also not expected to impact on the streams.	To be assessed during the EIA
		Decommissioning	-9	-4.5		
		Closure	-9	-4.5		
	Contaminant Seepage from WRD (Option 1: Watertank and A-Zone pits backfilled with WRD)	Decommissioning	-9	-4.5	This risk is regarded as a longer-term risk and two alternatives, as described above, were evaluated to mitigate this risk. The primary receptors that may be impacted are the private groundwater users. Due to the streams being losings streams any groundwater contamination is also not expected to impact on the streams.	To be assessed during the EIA
		Closure	-9	-4.5		



10 PLAN OF STUDY FOR THE 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&APs and other stakeholders during the Scoping Report public review period.

10.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED

The alternatives considered and discussed in Section 6 of this Scoping Report, have culminated into the identification of feasible development alternatives to be addressed further in the EIA phase of this EIA process. The feasible development alternatives to be further assessed in the EIA phase are presented below.

10.1.1 DESIGN OR LAYOUT ALTERNATIVES

The preliminary positions or layout as indicated in Figure 3 has been assessed with regards to potential impacts on the receiving environment as part of the Scoping phase. The preliminary layout will be further investigated in the EIA phase. If any infrastructure is planned to be located in areas identified as being of high environmental sensitivity or if any other significant environmental concerns are noted with regards to the proposed design and / or layout, then the layout may require to be amended based on these findings. More details regarding the preliminary layout and on-site sensitivities will be provided in the EIA phase once the detailed specialist impact assessment studies have been completed. This scoping phase micro-siting information will be provided to the specialists to inform their impact assessments during the EIA phase.

10.1.2 NO GO ALTERNATIVE

The no-go option means ‘do nothing’ or the option of not undertaking the proposed Kalgold Expansion Project or any of its alternatives. The ‘do nothing’ alternative or keeping the current status quo of production also provides the baseline against which the impacts of other alternatives should be compared.

The no-go alternative would mean that the benefits of local and regional employment associated with the expansion project would not be realised in the long term. The potential employment and economic benefits will therefore be forgone. The no-go alternative would maintain the current environmental status quo at the site. This will be considered in detail during the EIA Phase.

10.2 NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL

Regulation 16(1)(b)(v) of the NEMA EIA Regulation, 2014, requires that an application for EA must include “the report generated by the national web based environmental screening tool”, The report is attached as Appendix F of this report.

Based on the screening tool selected classification, and the environmental sensitivities of the proposed development footprint, a number of specialist assessments have been identified for inclusion in the assessment report. As per the screening report, it is the responsibility of the EAP to confirm the list and to motivate in the assessment report, the reason for not including any of the identified specialist studies.

Some of these specialist studies were deemed to be not applicable for the proposed expansion activities on Kalgold. Details of which specialist studies have been determined to be applicable and not applicable to this project and those which will not be considered in the EIA phase are included in Table 24 below.

Table 24: Screening tool studies

Study	Analysis	Specialist assessment to be included in EIA?
Agricultural Impact Assessment	An Agricultural Impact Assessment will be conducted in the EIA phase.	Yes



Study		Analysis	Specialist assessment to be included in EIA?
Landscape/Visual Assessment	Impact	<p>The proposed expansion activities are proposed within an existing operational mine. The nature of the proposed activities will therefore be consistent with the surrounding land use and the visual expectations for the area.</p> <p>No specialist assessment of visual impacts is therefore proposed in the EIA phase however visual impacts will be assessed by the EAP. It is proposed that visual impacts during the construction phase are managed through standard management measures in the EMPr</p>	No
Archaeological and Cultural Heritage Impact Assessment		An Archaeological and Cultural Heritage Impact Assessment will be conducted in the EIA phase.	Yes
Palaeontology Assessment	Impact	A Palaeontological Impact Assessment will be conducted in the EIA phase.	Yes
Terrestrial Biodiversity Impact Assessment		A Terrestrial Biodiversity Impact Assessment will be conducted during the EIA.	Yes
Aquatic Biodiversity Impact Assessment		An Aquatic Biodiversity Impact Assessment will be conducted during the EIA.	Yes
Hydrology Assessment		A Hydrology Assessment will be conducted during the EIA.	Yes
Noise Impact Assessment		<p>The proposed expansion activities are proposed within an existing operational mine. The nature of the proposed activities will therefore be consistent with the existing operations and acoustic expectations of the area.</p> <p>No specialist assessment of noise impacts is therefore proposed in the EIA phase. It is proposed that noise impacts during the construction phase are managed through standard management measures in the EMPr.</p>	No
Radioactivity Assessment	Impact	<p>Additional tailings produced by the expansion activities will be deposited on existing and approved facilities. Relevant studies on radioactivity will be provided in the EIA phase.</p> <p>No new radioactivity impact assessment is therefore proposed in the EIA phase. It is proposed that radio activity impacts during the construction, operation and decommissioning phases are managed through standard management measures in the EMPr.</p>	No
Traffic Impact Assessment		Due to additional access required on the N18 and other infrastructure required to cross the N18, a	Yes



Study	Analysis	Specialist assessment to be included in EIA?
	Traffic Impact Assessment will be conducted in the EIA Phase.	
Geotechnical Assessment	Geotechnical assessments for relevant infrastructure will be conducted by Harmony through a separate process and will be provided to EIMS during the EIA phase.	Yes
Climate Impact Assessment	<p>The proposed expansion activities are proposed within an existing operational mine. The nature of the proposed activities will therefore be consistent with the existing operations.</p> <p>An Air Quality Impact Assessment is being conducted to determine impacts due to the emissions from the proposed expansion activities. No climate Impact Assessment will be conducted for the expansion activities.</p>	No
Health Impact Assessment	Anticipated potential health impacts associated with air quality will be considered in the respective specialist study. No separate Health Impact Assessment will be conducted.	No
Socio-Economic Assessment	A Socio-Economic Assessment is being conducted.	Yes
Ambient Air Quality Impact Assessment	An Air Quality Impact Assessment is being conducted.	Yes
Seismicity Assessment	Seismic impacts will be considered as part of the geotechnical assessment for relevant infrastructure and will be conducted by Harmony through a separate process and will be provided to EIMS during the EIA phase.	No
Plant Species Assessment	Plant species assessment will be conducted as part of the Terrestrial Biodiversity Impact Assessment.	Yes
Animal Species Assessment	Animal species assessment will be conducted as part of the Terrestrial Biodiversity Impact Assessment.	Yes

10.3 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The following aspects will be assessed further during the EIA phase investigations to be undertaken with the relevant specialist input:

- Heritage (archaeological and palaeontological);
- Socio-Economic;
- Biodiversity;
- Soils;
- Hydrology (surface water);



- Traffic Impacts
- Geohydrology (ground water);
- Freshwater ecology;
- Air quality; and
- Closure and Rehabilitation (including updated financial provisions).

10.4 ASPECTS TO BE ASSESSED BY SPECIALISTS

Table 25 below details the various aspects of the project to be addressed in the EIA phase through detailed impact assessment specialist studies. The table also includes a proposed scope of work / terms of reference for each of the impact assessment specialist studies.



Table 25: Details of EIA scope of work

Aspect	Component	Company Responsible	Scope of Work for EIA
Air quality	Air Quality Impact Assessment	Airshed	<p>During the EIA phase an Air Quality Impact Assessment (AQIA) will be conducted in the prescribed specialist report format in accordance with Appendix 6 of the EIA Regulations (2014, as amended). The following will also be conducted:</p> <ul style="list-style-type: none"> • The dispersion modelling executed as per The Regulations Regarding Air Dispersion Modelling (GN 533 in Gazette No 37804, 11 July 2014). Three Levels of Assessment are defined in the Regulations. A Level 2 assessment approach was deemed adequate. These are described under Section 0. • Preparation of the model control options and input files for the AERMOD dispersion modelling suite. This includes the compilation of: <ul style="list-style-type: none"> ○ terrain information (topography, land use, albedo and surface roughness); ○ source layout; and ○ grid and receptor definitions. • Preparation of hourly average meteorological data for the wind field and atmospheric dispersion model. • Preparation of an emissions inventory for the existing and proposed operations, including fugitive sources and point sources. The emission rates for the existing stacks will be based on isokinetic sampling measurements and Minimum Emission Standards (MES), and emission factors will be used for the fugitive sources. • For the study, simulations will be conducted using the AERMOD dispersion modelling suite, which allows for the calculations of the ambient inhalable concentrations (PM2.5, PM10, SO2, NOx and CO) and dust fallout. The hourly, daily and annual concentrations and



Aspect	Component	Company Responsible	Scope of Work for EIA
			<p>total daily dust deposition will be calculated. Dispersion modelling will be completed for all operations associated with the proposed operations as well as the existing Kalgold operations.</p> <ul style="list-style-type: none"> The legislative and regulatory context, including emission limits and guidelines, ambient air quality guidelines and dustfall classifications will be used to assess the impact and recommend additional emission controls, mitigation measures and air quality management plans to maintain the impact of air pollution to acceptable limits in the study area. The model results will be analysed against the National Ambient Air Quality Standards (NAAQS) and National Dust Control Regulations (NDCR).
Terrestrial Ecology	Terrestrial Ecology (Fauna and Flora) Scoping Report	The Biodiversity Company	<p>The following will be undertaken in more detail during the EIA phase:</p> <ul style="list-style-type: none"> The field survey for fauna will be undertaken concurrently with vegetation surveys. All animals observed in the project area will be noted. Ecological indicators, such as calls, tracks and dung will be noted and regarded as indicative of the presence of that particular animal. A detailed fauna lists will be compiled and discussed in relation to the floristic survey findings. The probability of occurrence for species not observed during field surveys will be considered if applicable regarding available habitats. Protected and endemic species will be the focus of discussion. Faunal composition of disturbed sites will be compared to the composition of undisturbed areas. The field survey component of the study will utilise a variety of sampling techniques including, but not limited to, the following: <ul style="list-style-type: none"> Timed meander (vegetation);



Aspect	Component	Company Responsible	Scope of Work for EIA
			<ul style="list-style-type: none"> ○ Camera trapping; ○ Active sampling; ○ Visual observations; ○ Small mammal trapping; ○ Identification of tracks and signs; and ○ Utilization of local knowledge. <ul style="list-style-type: none"> ● The current status of the faunal environment will be determined and an evaluation of the extent of site-related effects in terms of certain ecological indicators, as well as identification of specific important ecological attributes such as rare and endangered species, protected species, sensitive species and endemic species will be made. The habitat will be characterised in relation to biota and the extent of site related effects. Presence of red data and protected species will be indicated on a map. Habitats present will be identified and delineated.
Hydrology (surface water)	Surface Water Report	Hydrologic Consulting	<p>The following will be undertaken in more detail during the EIA phase:</p> <ul style="list-style-type: none"> ● A detailed impact and mitigation assessment will be undertaken with adherence to EIMS' environmental risk/impact assessment methodology for planning and construction, operational and decommissioning, rehabilitation and closure phases of the preferred alternatives. This methodology accounts for the magnitude, significance and duration of the proposed risk/impact and assigns each risk/impact a status (High, Medium or Low). Mitigation measures for each risk/impact will be recommended and the potential risk/impact status will be reassessed assuming the proposed mitigation measures are put



Aspect	Component	Company Responsible	Scope of Work for EIA
			<p>in place. Risk/Impact calculations tables as per EIMS' methodology will be included in the detailed hydrological impact report.</p> <ul style="list-style-type: none"> • A conceptual storm water management plan (SWMP) for the proposed expansion will be developed. This will exclude existing infrastructure where possible, which is expected to already have an acceptable SWMP in place. • The existing water balance for the site will be updated to include the proposed expansion.
Geohydrology (groundwater)	Groundwater Report Waste Classification	MvB Consulting	A Geohydrological Study (groundwater assessment) has been undertaken and the findings thereof included in this Scoping Report. The findings of the geohydrological study will further be utilised towards the completion of the EIA Report during the EIA phase.
Freshwater Ecology (Wetland)	Freshwater Ecology Scoping Report	The Biodiversity Company	<p>The following will be undertaken in more detail during the EIA phase:</p> <ul style="list-style-type: none"> • A detailed freshwater ecology (wetland) baseline and impact assessment report will be submitted for the Environmental Impact Assessment (EIA) phase of the project; and • A field survey will be conducted.
Heritage	Heritage Scoping Report	PGS Heritage	The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage (PGS) for the proposed Kalgold Expansion Project will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the NHRA (Act 25 of 1999), the National Environmental Management Act (NEMA) (Act 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002). The HIA process consists of three steps:



Aspect	Component	Company Responsible	Scope of Work for EIA
			<ul style="list-style-type: none"> • Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site; • Step II – Physical Survey: A physical survey was conducted on foot and by vehicle through the proposed project area by heritage specialists, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint. – Completed during the Scoping Phase; and • Step III – The final step involves the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations. <p>The significance of heritage sites was based on four main criteria:</p> <ul style="list-style-type: none"> • Site integrity (i.e. primary vs. secondary context); • Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures); <ul style="list-style-type: none"> ○ Density of scatter (dispersed scatter), ○ Low - <10/50m², ○ Medium - 10-50/50m², and ○ High - >50/50m²; • Uniqueness; and • Potential to answer present research questions. <p>Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:</p> <p>A – No further action necessary;</p>



Aspect	Component	Company Responsible	Scope of Work for EIA
			<p>B - Mapping of the site and controlled sampling required;</p> <p>C - No-go or relocate pylon position</p> <p>D - Preserve site, or extensive data collection and mapping of the site; and</p> <p>E - Preserve site</p> <p>Site Significance – Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.</p>
<p>Agricultural Potential</p>	<p>Agricultural Potential Scoping Report</p>	<p>The Biodiversity Company</p>	<p>The following will be undertaken in more detail during the EIA phase:</p> <p><u>Field Verification Methodology:</u></p> <ul style="list-style-type: none"> • A soil auger will be used to determine the soil form / family and depth. • The soil will be hand augured to the first restricting layer or 1.5 m. • Soil survey positions will be recorded as waypoints using a handheld GPS. • Soils will be identified to their soil family level as per the “Soil Classification: A Taxonomic System for South Africa” (Soil Classification Working Group, 1991). • Landscape features such as existing open trenches will also be helpful in determining soil types and depth. <p><u>Agricultural Potential Assessment:</u></p> <p>Land capability and agricultural potential is determined by a combination of soil, terrain and climate features. Land capability is defined by the most intensive long-term sustainable use of land</p>



Aspect	Component	Company Responsible	Scope of Work for EIA
			<p>under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes (Smith, 2006)</p> <p>Land capability is divided into eight classes and these may be divided into three capability groups. The land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006). The land potential classes are determined by combining the land capability results and the climate capability of a region.</p>
Social	Socio-Economic Scoping report	NLN Consulting (Pty) Ltd	<p>The activities that will form part of the impact assessment phase are guided by the information requirements and EIA studies as summarised below:</p> <ul style="list-style-type: none"> • Consult with the project proponent and/or its appointed or shortlisted contractor(s) on aspects mentioned in the scoping phase SIA; and • Attend a public meeting within a PDI community (if such a meeting will be held) to determine the expressed interest for jobs and the likelihood that the availability of such jobs would be communicated to people outside the project area.
Traffic	Traffic Impact Assessment	TBC	Assessment of the potential Impacts on the N18 and adjacent roads due to the proposed expansion activities.



10.5 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 Scoping Report.

10.6 PROPOSED METHOD FOR ASSESSING DURATION 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 (“nice-to-haves”).

10.7 STAGES AT WHICH COMPETENT AUTHORITIES WILL BE CONSULTED

Competent authorities were consulted during the initial notification period, the scoping phase, and will further be consulted during the EIA phase.

10.8 PROPOSED METHOD OF EIA PHASE PUBLIC PARTICIPATION

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

- The commenting periods that will be provided to the I&AP’s (and the competent authorities) will be 30 days as per the relevant legislative requirements.
- The dates of the review and commenting period for the draft EIA/EMPr will be determined at a later date and communicated to all registered I&AP’s through faxes, emails, SMS’s and/or registered letters.
- The location at which the hard copy of the EIA report will be made available is at the same public places in the project area that the Scoping Report was made available (refer to Section 7.4), 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. Depending on Covid-19 Directions, this meeting may be held virtually.
- All comments and issues raised during the comment periods will be incorporated into the final EIA Report.

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

The plan of study in terms of certain aspects or specialist fields is detailed in the above sections, and is summarised below. The following tasks will be undertaken as part of the EIA phase of the project:

- Detailed specialist studies;
- Public consultation:
 - Notification of the availability of the EIA Report for review and comment to all registered I&APs;



- Informing registered I&APs of the project progress; and
- Public and focus group meetings, if required.
- Authority consultation:
 - Consultation with DMRE and the commenting authorities; and
 - Other relevant / commenting authorities' consultation (including meetings where necessary) to provide authorities with project related information and obtain their feedback.
- Document compilation:
 - The EIA Report and associated EMPr will be compiled in line with the requirements of Appendix 3 and 4 of the NEMA EIA Regulations (2014, as amended);
 - The EIA Report and EMPr will be made available for public comment for a period of 30 days; and
 - The EIA Report and EMPr will be finalised and submitted to the DMRE.

10.10 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.; and
 - Irreversible.
- Irreplaceable loss of resources:
 - Replaceable;
 - Partially replaceable; and
 - Irreplaceable.
- Potential of impacts to be mitigated:
 - High;
 - Medium; and
 - Low.

The assessment findings for each identified impact taking the above into consideration will be provided in the EIA Report and associated EMPr.



11 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 (base maps 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 Kalgold Expansion Project 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 Kalgold Expansion Project 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 26 below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect, and Figure 29 below presents how the sensitivity mapping technique integrates numerous datasets into a single consolidated sensitivity layer, and Figure 30 presents the preliminary combined sensitivity map according to heritage, biodiversity, wetlands, social, soil land types, blasting and vibrations, noise and air quality sensitivities in and around the proposed Kalgold Expansion Project area.

The preliminary combined sensitivity map includes individual sensitivities according to heritage, social, blasting and vibration, noise, wetlands, air quality and soil land type features in and around the project area (refer to Appendix B for the individual sensitivity maps). The sensitivities related to geohydrology (groundwater), visual, land use economics and climate change were excluded as their effects cannot be directly or accurately measured to ascertain sensitivity. Climate change effects occur over time and at a very broad scale influencing several features and thus, it is not possible to assign sensitivity at project area level. Groundwater features are continuous in nature and their sensitivity or vulnerability dependant on various entities (e.g. water travel time, contamination migration, plume stability, soil, etc.) making it difficult to directly and accurately measure or assign sensitivity at project area level. Furthermore, land use economics pertain to the economic value of different land uses in an area which cannot be allocated sensitivity criteria due to their variability. Lastly, the exclusion of visual sensitivity as part of the combined sensitivity map does not mean that there will be no visual sensitivities, but indicates that the entire site and its surroundings is already visually impacted upon by similar activities as the proposed development and thus the project area and its immediate surroundings cannot be assigned different levels of sensitivity.

The identified preliminary sensitivities (social, hydrology, wetlands, biodiversity and air quality features) will be further assessed during the EIA phase, and a final combined sensitivity map produced which will inform the selection of the preferred location and layout alternatives for the proposed Kalgold Expansion Project new mining pit and associated stockpiles, as well as some secondary access roads where required.



Table 26: 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
High	The proposed development will moderately negatively influence the current status of the feature.	1
Very high	The proposed development will have a significantly negative influence on the current status of the feature.	2

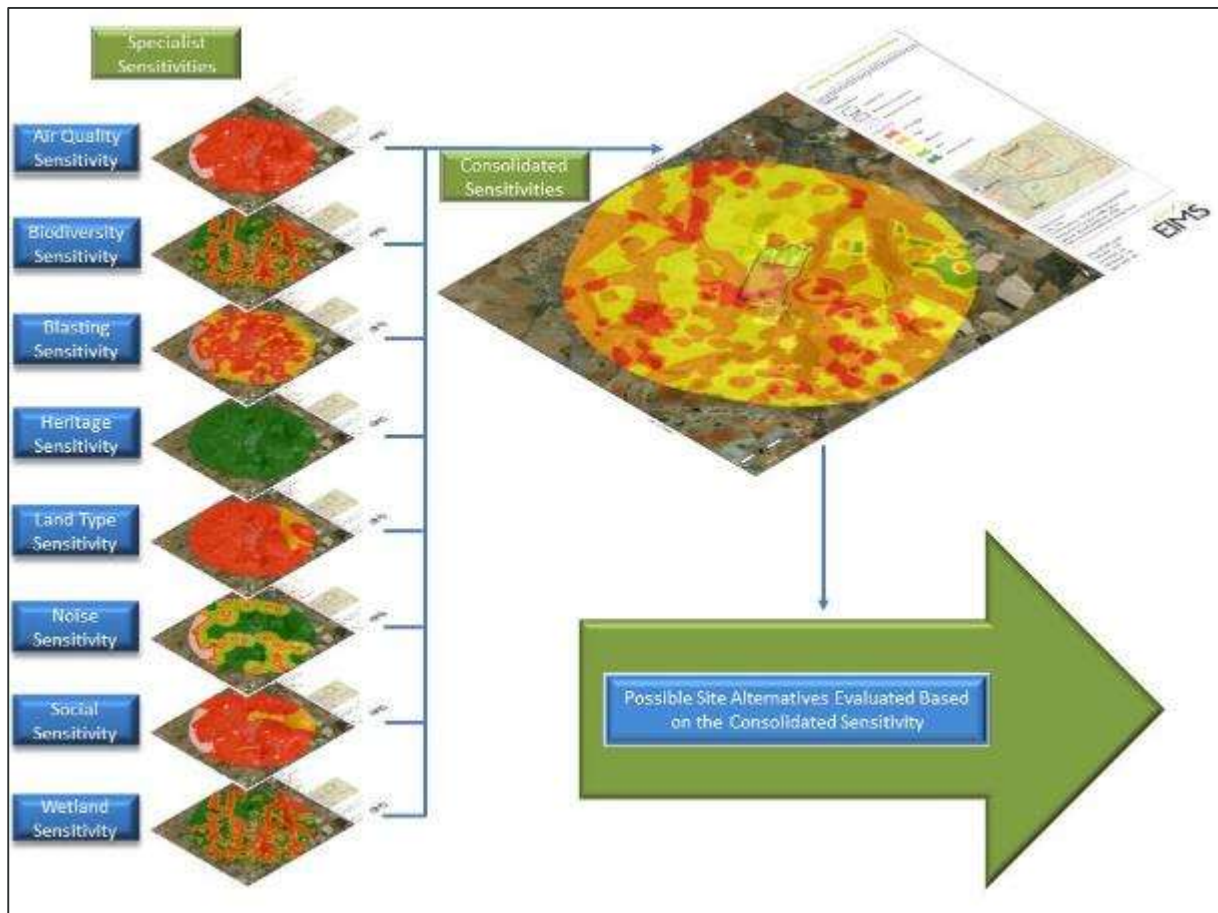


Figure 29: Sensitivity mapping approach

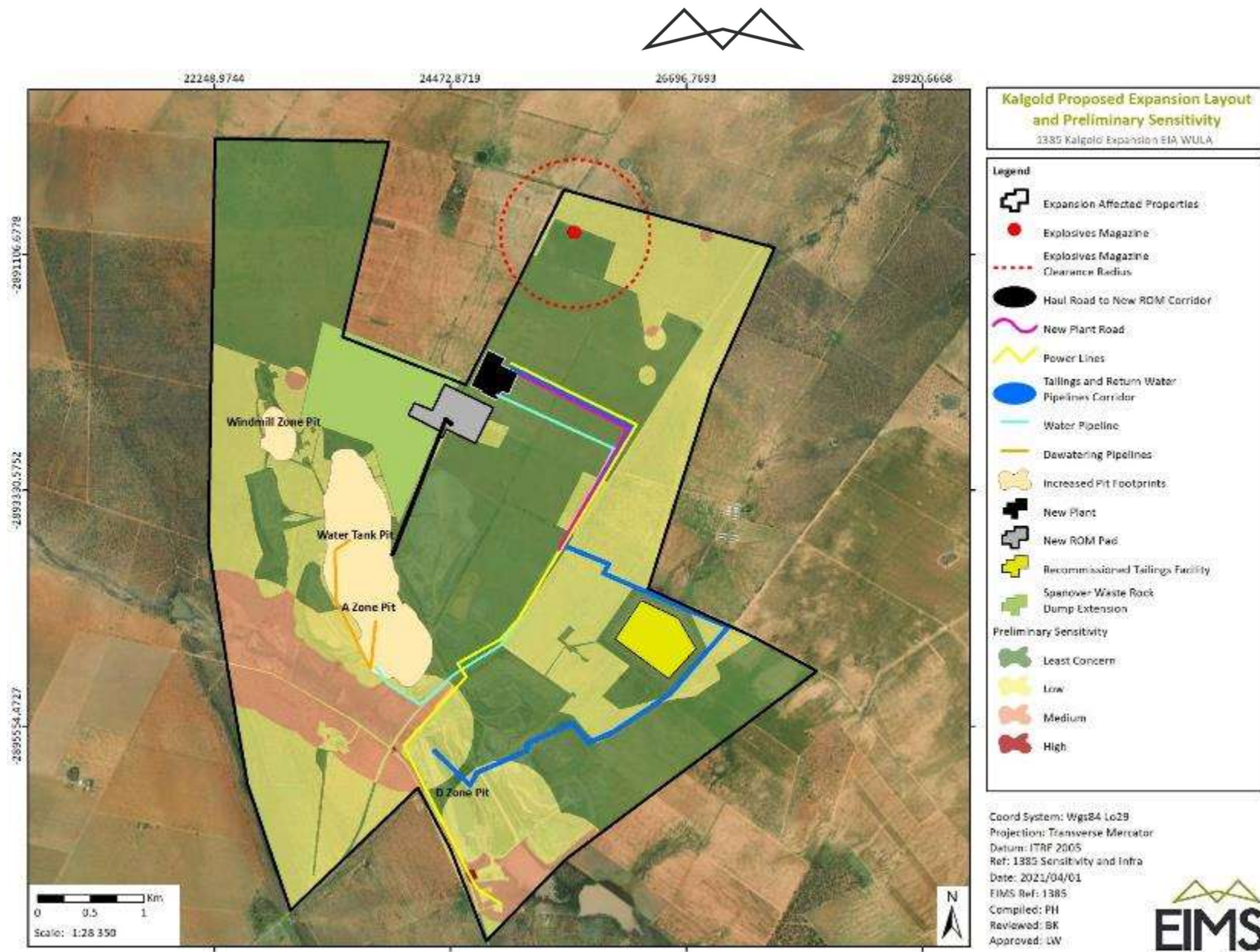


Figure 30: Combined sensitivity map



12 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTIES

Certain assumptions, limitations, and uncertainties are associated with the Scoping Phase. This report is based on information that is currently available and, as a result, the following limitations and assumptions are applicable:

- The Scoping Report is based on project information provided by the client;
- The Scoping Report is based on a project description taken from drawings and design specifications for the proposed mine extension that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive. A project description based on the final design will be provided in the EIA phase;
- The description of the baseline environment has been obtained from specialist studies; and
- The levels of confidence for the impact assessment section (Chapter 9) are considered low until detailed specialist input is obtained in the EIA phase.

Furthermore, certain assumptions, limitations, and uncertainties are associated with the Scoping phase specialist studies and these are detailed for each aspect below.

12.1 TERRESTRIAL ECOLOGY

With respect to this scoping study, the following assumptions and limitations have been made:

- The assessment represents the Scoping phase of the project only;
- The sensitivity map included in this report is based on desktop information alone;
- The impact assessment in this report is based on desktop information alone; and
- A field survey still needs to be conducted to further advise on the viability of the alternatives.

12.2 FRESHWATER ECOLOGY

With respect to this scoping study, the following assumptions and limitations have been made:

- This assessment represents the Scoping Phase of the project only. Further field surveys a final baseline and impact assessment report will be submitted once the field studies have been concluded;
- A GN 509 risk assessment will be completed once the field assessment has been completed to adequately assess all potential risks associated with the expansion;
- The sensitivity map included in this report is based on desktop information alone; and
- A field survey still needs to be conducted to further advise on the viability of the project aspects.

12.3 AGRICULTURAL POTENTIAL

With respect to this scoping study, the following assumptions and limitations have been made

- This assessment represents the Scoping Phase of the project only. After further field surveys a final baseline and impact assessment report will be submitted;
- The sensitivity map included in this report is based on desktop information alone; and
- A field survey still needs to be conducted to advise on the viability of the alternatives



12.4 HYDROLOGY (SURFACE WATER)

The risk/impact assessment undertaken within this study is a preliminary risk assessment based on a desktop assessment. All identified risks/impacts and proposed mitigation measures will be verified in the EIA phase of the hydrological assessment. Impact calculations tables as per EIMS methodology will be included in the detailed hydrological impact report.

12.5 GEOHYDROLOGICAL (GROUNDWATER)

The conceptual model forms the basis for the numerical groundwater flow and contaminant transport models that were used to assess the potential impacts associated with the proposed new activities on both groundwater quality and water levels. The following conditions typically need to be described in a model:

- Geological and geohydrological features;
- Boundary conditions of the study area (based on the geology and geohydrology);
- Initial groundwater levels of the study area;
- The processes governing groundwater flow; and
- Assumptions for the selection of the most appropriate numerical code. Field data is essential in solving the conditions listed above and developing the numerical model into a site-specific groundwater model.

Specific assumptions related to the available field data include:

- The top of the aquifer is represented by the generated groundwater heads;
- The available geological / geohydrological information was used to describe the different aquifers. The available information on the geology and field tests is considered as correct; and
- Many aquifer parameters have not been determined in the field and therefore must be estimated.

In order to develop a model of an aquifer system, certain assumptions must be made. The following assumptions were made:

- The system is initially in equilibrium and therefore in steady state, even though natural conditions have been disturbed;
- The boundary conditions assigned to the model are considered correct; and
- The impacts of other activities (e.g. agriculture) have not been considered. It is important to note that a numerical groundwater model is a representation of the real system.

It is therefore at most an approximation, and the level of accuracy depends on the quality of the data that is available. This implies that there are always errors associated with groundwater models due to uncertainty in the data and the capability of numerical methods to describe natural physical processes.

12.6 AIR QUALITY

The following important assumptions, exclusions and limitations to the specialist study should be noted:

- All project information was provided by EIMS; it is assumed that all this information is the most recent data and correct.
- Meteorology:
 - Data was available from one on-site weather station. The data for the period August 2019 to September 2020 was available but the data availability is insufficient for dispersion modelling and three years of WRF (Weather Research and Forecasting) modelled data will be acquired for the next phase of the assessment.
 - The National Code of Practice for Air Dispersion Modelling described in the Regulations regarding air dispersion modelling prescribes the use of a minimum of one year of on-site data or at least three years of appropriate off-site data for use in Level 2 and Level 3 assessments. It also states that the



meteorological data must be for a period no older than five years to the year of assessment. The WRF dataset period will be selected to be within the timeframe recommended by the National Code of Practice for Air Dispersion Modelling, that is three years of data less than five years old will be acquired for the impact assessment.

- Emissions:
 - The impact assessment will be limited to the pollutants of concern (those included in report). Some of these pollutants are regulated under NAAQS and considered key pollutants released by the operations associated with the future operations.
 - The quantification of sources of emission will be restricted to the Kalgold operations (current and future). Other existing sources of emission within the area including farming activities, domestic fires, biomass burning, vehicle exhaust emissions and dust entrained by vehicles on public roads will not be included as part of the emissions inventory and simulations. Without detailed proposed (for when this project will be operational) operational data for other companies' mining and processing operations as well as estimated future vehicle data for public roads it is difficult to quantify these sources for the period of the proposed project operations. It is difficult to predict the contribution of the domestic and natural fires and farming sources to air quality during the period of the proposed project operations due to variability of these operations with regards to locality, spatial extent and duration.
- Greenhouse gases (GHG):
 - Emissions estimation and modelling is not included in the scope of work.
- Dispersion Simulations:
 - For the current operations, all significant fugitive sources will be simulated with the current mitigation measures applied and the most recent average stack emissions will be included in the dispersion simulation task.
 - It will be assumed that all NO_x emitted is converted to NO₂.
- Assessment of impacts:
 - The health risk assessment is limited to the screening of ambient air concentrations against NAAQS and applicable international legal guidelines and limits and does not include a detailed human health risk assessment. Human health risk can occur due to exposures through inhalation, ingestion and dermal contact. The scope of the study will be confined to the quantification of impacts due to exposures via the inhalation pathway only.
 - A human health risk and nuisance and environmental impact screening assessment for the operational phase (current and future) will be based on dispersion simulation results.
 - The EA process will be completed by EIMS. For this reason, the expected impact significance of the operations was determined based on the EIMS impact significance methodology. The impact significance ratings provided in this report are based on the specialist knowledge and impacts from similar operations

12.7 HERITAGE

This report excludes fieldwork that is to be completed as part of the HIA Report.

12.8 SOCIAL

This report excludes fieldwork that is to be completed as part of the EIA phase where required.



13 UNDERTAKINGS

13.1 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I **Bongani Khupe** herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected Parties has been correctly recorded in the report.

Signature of the EAP

Date: 29 April 2021

13.2 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **Bongani Khupe** 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: 29 April 2021



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15 APPENDICES

Appendix A: Environmental Assessment Practitioner (EAP) Curriculum Vitae

Appendix B: Maps

Appendix C: Public Participation

Appendix D: Specialist Reports

Appendix E: Impact Assessment Matrix

Appendix F: DEA Screening Tool Report