Dwarsrivier Chrome Mine (Pty) Ltd

DRAFT Scoping Report for the new Khulu Tailings Storage Facility (TSF) and other Capital Projects

Report Purpose

Draft Report for Stakeholder Review

Report Status

Final Draft V2

Report Reference

EnviroGistics Ref.: 21828_F2

Departmental Ref.: 30/5/1/3/2/1(179) EM

Mining Right Ref: 30/5/1/3/2/1(179) EM

Report Author

Tanja Bekker
MSc. Environmental Management
EAPASA Reg. 306-2019; SACNASP Reg. 400198/09

22 July 2021

Author

Tanja Bekker is registered as a Professional Natural Scientist in the field of Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) and is also a registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), a legal requirement stipulated by the National Environmental Management Act, 1998. She is further certified as an ISO 14001 Lead Auditor. Her qualifications include BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and MSc. Environmental Management. In addition to her tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advancement Programme at Wits Business School.

With more than 19 years' experience in environmental management and the consulting industry, she follows a methodical and practical approach in attending to environmental problems and identifying environmental solutions throughout the planning, initiation, operation and decommissioning or closure of projects.

Disclaimer

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge, as well as available information. Information utilised and contained in this report is based on data/information supplied to EnviroGistics (Pty) Ltd by the client and other external sources (including previous site investigation data and external specialist studies). EnviroGistics (Pty) Ltd exercises due care and diligence in rendering services and preparing documents, however it has been assumed that the information provided to EnviroGistics (Pty) Ltd is correct and as such the accuracy of the conclusions made are reliant on the accuracy and completeness of the data supplied. No responsibility is accepted by EnviroGistics (Pty) Ltd for incomplete or inaccurate data supplied by the client and/or other external sources. Opinions expressed in this report apply to the site conditions and features that existed at the time of the start of the relevant investigations and the production of this document. For this reason, EnviroGistics (Pty) Ltd accepts no liability, and the client by receiving and therefore accepting this document, indemnifies EnviroGistics (Pty) Ltd and its directors against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with the services rendered, directly or indirectly.

The document may not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports.

Copyright

Quality Control

Report Title	DRAFT SCOPING REPORT FOR THE NEW KHULU TSF FACILITY AND OTHER CAPITAL PROJECTS	
Report Ref. No.	21828_FD	
Report Status	Final Draft	
Report Purpose	Draft for Stakeholder Review	
	Signature	**Date**
Author	Tanja Bekker	25 June 2021
Reviewer	Michelle Pretorius	6 July 2021
	Client Approval	8 July 2021

Amendments

Report Ref:	Nature of Amendment	Date	Report Output Ref:
21828_D1	Inclusion of External Review; inclusion of updated emulsion project description	6 July 2021	21828_D2
21828_D2	Clarification of engineering constraints around Site D	8 July 2021	28828_FD
28828_FD	Inclusion of updated groundwater information as result of latest available fieldwork relating to the alluvial aquifer at Site B.	8 July 2021	28828_FD2

Distribution

Distributed To:	Purpose:	Date	Format/Amount
Pieter Schoeman	Applicant Review	25 June 2021	Electronic
Tanja Bekker	Inclusion of External review	6 July 2021	Electronic
Pieter Schoeman	For Applicant approval	6 July 2021	Electronic
Tanja Bekker	Inclusion of Applicant Comments	8 July 2021	Electronic
Pieter Schoeman	For Applicant approval	8 July 2021	Electronic
Tanja Bekker	Finalisation and printing of report	19 July 2021	Electronic
DWS, Municipality, DAFF, DMRE, Registered Stakeholders, LEDET	For Stakeholder Review	23 July 2021	Hard Copies and Electronic Copies

Executive Summary

Introduction

Dwarsrivier Chrome Mine (Pty) Ltd (hereafter referred to as "Dwarsrivier Mine" or "the mine") is wholly owned by Assore Ltd ("Assore").

Dwarsrivier Mine is situated approximately 60km northwest of Lydenburg, 25km south of Steelpoort and 63km northeast of Roossenekal in the Limpopo Province. The mine currently holds the surface rights for Portion 1 (Remaining Extent (RE)) and Portion 0 (RE) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grooteboom 373KT.

The operation is located in the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.

The mine originated as a result of neighbouring properties to the north and south thereof, which had existing chrome mining operations at the time of purchase in 1998. The owners of Dwarsrivier Mine therefore invested in a feasibility study for the Plant, the old Tailings Storage Facility and the mining of chrome. The designs for the opencast and underground mines then commenced. Approval to proceed with the final design and construction of work was given in July 1999 (http://www.assmang.co.za/chrome.asp). The mine ceased opencast operations in 2006 and is currently operating as an underground (trackless, board and pillar operation) mine, producing chromite ore, with a Dense Medium Separation and Spiral Beneficiation Plant. Dwarsrivier Mine currently produces approximately 200 000 tons of chromite ore per month.

The mine was previously owned by Assmang (Pty) Ltd ("Assmang") with a 50% share. This results from the approval by the Department of Mineral Resources (DMR) of the Section 11 Transfer in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) of Dwarsrivier Mine from African Rainbow Minerals (ARM) to Assore. The change of ownership officially came into effect on 1 August 2016. All Environmental Authorisations and Waste Management Licences (WMLs) were transferred with approval issued by the Competent Authority (Department of Mineral Resources and Energy) (DMRE) during May 2019. Currently the Water Use Licence, 2008 (WUL, 2008) has also been transferred to Dwarsrivier Chrome Mine, with the WUL, 2011 and WUL, 2013 amendments currently pending.

It is the intention of Dwarsrivier Mine to initiate certain additional infrastructure and activities on site. These will include:

- Project 1: Khulu TSF Project;
- Project 2: Diesel and Emulsion Batching;
- Project 3: Main Parking Extension;
- Project 4: Widening of access road between South Shaft/ Main Offices and Plant; and
- Project 5: Access Crossing between Plant and North Mine.

Project Description

Project 1: Khulu TSF

Dwarsrivier Mine is currently depositing tailings material at the existing North Tailings Storage Facility (North TSF) at the eastern side of their process plant on Portion RE of the Farm Dwarsrivier 372KT. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years. For this reason additional storage capacity on site is required.

The mine initially identified seven (7) potential sites for the proposed new TSF, which have since been reduced to four (4) sites (TSF Options), namely Sites B, C, D and F. During the 2019 Site Selection Process, Site D was identified as the preferred site, however, subsequent to the 2019 Site Selection Process, further geotechnical and engineering studies were undertaken, which identified potential concerns for Site D, which include the proximity of a non-perennial tributary of the Dwarsrivier River to the site. Based on the initial view by the Environmental Assessment Practitioner (EAP), Site B was fatally flawed due to its location coinciding with that of the potential future Eskom substation, for which an Environmental Impact Assessment EIA) has been granted and negotiations in terms of land use between the mine and Eskom have commenced. In addition to this, the Eskom substation is no longer planned, which has reintroduced Site B into the overall assessment. The geotechnical and engineering studies have excluded Site F as a potential site alternative due to the distance of this site from the plant, reducing the number of areas considered to three (3).

The site alternatives and corresponding footprint areas and anticipated heights, are as follows:

- Site B: 20 hectares (ha), 37m high;
- Site C: 28ha, 29m high; and
- Site D: 21ha, 49m high.

The project will not involve typical tailings deposition techniques, but will involve the piping of tailings to a filter press facility from where the filter cake will be trucked to the new TSF. An operational life of about 20 years is currently considered as part of the design.

The following figure illustrates the initial sites which will be subjected to a site selection.

Project 2: Diesel and Emulsion Batching

As the underground mining progresses in line with the approved Mining Works Programme, it is required that the surface infrastructure be adapted to suit the development of the mining operations. The surface developments are undertaken to provide efficient and safe operation from a life safety, environmental safety and cost effective operation perspective. Given the current area of operation at South Shaft and considering the following five (5) year mining plan, the need to consider additional off-loading and bulk Storage of Emulsion and Diesel closer to the immediate work area to a surface position over current strikes at the South Shaft decline have arose. The mine therefore identified the need to erect two (2) batching areas, for diesel and emulsion batching, respectively, to supply diesel and emulsion to the underground mining operations. The location of the diesel and emulsion batching areas are to the north-east of the old Two Rivers Platinum Mine (TRP) Tailings Storage Facility, with the Diesel Batching area just south of the new TRP Tailings Pipeline and the Emulsion Batching area just north of the pipeline. The project will include:

- Diesel Batching Area:
  - Construction of an access road, approximately 55m in length and 6m in width, to the Diesel Batching area;
  - Due to the imposed limitations of the Mines Health and Safety Act, 29 of 1996 that limits the storage of hydrocarbons to 3 (Three) days of operation, the majority of the diesel, hydraulic oil and lube oil required will be stored at surface in a purpose designed and constructed terminal that provides the necessary life safety and environmental safety required. The project will involve the storage of two (2) horizontal, aboveground diesel tanks of 33m^3 each (as well as a possible future 22m^3 tank), a 40m^3 API self-bunded tank (Isotainer) for Hydraulic Oil and a 20m^3 API self-bunded tank for Lube Oil. A total combined storage of 148m^3.
- Emulsion Batching Area:
  - Construction of an access road, approximately 80m in length and 6m in width, to the Emulsion Batching area;
  - No emulsion will be stored at the surface location and all product decanted will be stored underground at a purpose built depot located at Strike N15G / N17A. The surface location will be used for the express purpose of transferring emulsion from a designated road tanker, via the off-loading pipeline to the underground storage tanks.
  - The mine intends storing a total of 60 (Sixty) tons (similarly 60m3) of Emulsion product underground, with no surface storage being done and, no pipeline inventory.
- General:
  - Parking and offloading Area, with security offices at both areas (no dangerous good storage is planned to take place at any time);
  - Other internal roads will be required to access the various pipelines, these are however included into the overall clearance consideration of the project, and not as stand-alone roads.
  - The batching areas (diesel and emulsion) will feed into pipelines for underground use at both areas.

Clearance of indigenous vegetation will be required in the order of approximately 3ha (including Diesel and Emulsion Batching and the access road).).

Project 3: Main Parking Extension

The mine requires the expansion of the existing parking area at the Main Offices. The current parking area is about 0.8ha with the parking bays not sufficient to cater for the number of vehicles. The current parking bay comprises of a paved surface area and steel roof parking bays. The same principle will be applied at the extension area, and no new entrances will be required. The planned parking bay extension will be located about 20m from the Springkaanspruit.

Clearance of indigenous vegetation will be required in the order of approximately 0.5ha.

Project 4: Widening of Access Road between South Shaft/Main Offices and Plant

An existing road provides access between the Main Office Buildings and the Plant. The current width of the road ranges between 5m and 6m. The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic. The purpose is to improve the safe operation of traffic on this road.

Clearance of indigenous vegetation will be required in the order of approximately 0.3ha.

Project 5: Access Crossing between Plant and North Mine

To ensure more optimal logistical management of traffic between the South Mine and the North Mine, and to reduce the number of vehicles on the regional road, the mine is planning on constructing a road under the regional road bridge to allow for access between the two areas.

Clearance of indigenous vegetation will be required in the order of approximately 0.2ha.

Listed Activities

In terms of the National Environmental Management Act, 1998 (NEMA), there are three (3) listing notices which should be considered for this application. These listing notices were amended during April 2017. Listing Notice 1 (Regulation 983) activities require a Basic Assessment Process, whereas Listing Notice 2 (Regulation 984) activities require a full Environmental Impact Assessment (EIA) Process. Listing Notice 3 (Regulation 985) activities require a Basic Assessment Process if the area falls within certain geographic zones. The majority of the Dwarsrivier Mine is located in a Critical Biodiversity Area 1 (CBA1) with small portion thereof falling within an Ecological Support Area 2 (ESA2), while certain areas are also located within a threatened ecosystem, namely the Sekhukhuneland Mountainlands ecosystem, which is listed as Endangered. Therefore Listing Notice 3 is applicable when considering infrastructure and activities planned on site.

The following table details the listed activities relevant to this project:

Table i: Listed Activities being considered

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
Project 1					
Construction and operation of the new Khulu TSF	Option B: 20ha Option C: 28ha; Option D: 21ha	x	**Listing Notice 1, Activity 12** (specific should Site D be selected; potential river crossings will also be associated with Site C; and in the event that Site B is located in the alluvial aquifer and identified as a watercourse): The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1, Activity 19** (specific should Option D be selected; potential river crossings will also be associated with Option C; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse):** 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. **Listing Notice 2, Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **Listing Notice 3, Activity 14** (specific should Option D be selected; potential river crossings will also be associated with Option C; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	**Regulation 921, as amended by Regulation 633 dated 24 July 2015:** **Waste Management Activity, Category B, Activity 11**: 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).	**Section 21(g) water uses**
Construction and operation of associated infrastructure – Return Water Dam	This facility will form part of the overall TSF footprint as presented above – and will be finalised once the preferred site has been	x	**Listing Notice 1, Activity 12** (specific should Option D be selected): The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres (ii) infrastructure or structures with a physical footprint of 100 square metres or more;	-	**Section 21(g) water uses**

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
	selected, but could be in the region of 2ha.		where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. Listing Notice 1, Activity 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more (depending on the Return Water Dam requirements). Listing Notice 1, Activity 19 (specific should Option D be selected; and in the event that Site B is located in the alluvial aquifer and identified as a watercourse): 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. Listing Notice 2, Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. – this activity is triggered as the proposed dam would require approval in terms of a new Water Use (Section 21(g)) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). Listing Notice 2, Activity 16 (this will be dependent on the size and design of the Return Water Dam – and is currently not foreseen likely as it is planned to design the RWD below NWA dam safety thresholds): The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5m or higher or where the high water mark of the dam overs an area of 10ha or more. Listing Notice 3, Activity 14 (specific should Option D be selected; and in the event that Site B is located in the alluvial aquifer and identified as a watercourse): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted,		

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
			within 32 metres of a watercourse, measured from the edge of a watercourse. **Note that the clearance activity is included in the overall TSF footprint clearance.**		
Construction and operation of pipelines	Approximate lengths to be finalised during the EIA Phase: Option B: 1.5km; Option C: 2km; Option D: 1.5km	x	Listing Notice 1, Activity 10: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. Listing Notice 3, Activity 14 (should river crossings of pipelines be required – potentially for Option C): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	-	**Section 21(c) & (i) water uses (depending on which TSF Option is selected)**
Establishment of laydown areas and temporary offices	This will be a temporary site, within the footprint of the TSF demarcated area.	x	Listing Notice 3, Activity 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 (if applicable). It is not foreseen that any reservoirs in excess of 250m³ will be constructed for the purposes of any of the activities.	-	-
Construction of roads	Approximate lengths to be finalised during the EIA Phase: Option B: 1.5km; Option C: 2km; Option D: 1.5km	x	Listing Notice 1: Activity 12 (specific should Option D and potentially Option C be selected): The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or	-	**Section 21(c) & (i) water uses (depending on which TSF Option is selected)**

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
			(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1: Activity 19** (specific should Option D and potentially Option C be selected)**:** 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. **Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **Listing Notice 3, Activity 14** (specific should Option D and potentially Option C be chosen): The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.		
Construction of a Topsoil Stockpile	Less than 1ha	x	**Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. This area will be placed outside of a 1:100year flood line.	-	-
Project 2: Diesel and Emulsion Batching					
Dispatching of diesel and emulsion to the underground via pipelines.	80m and 50m access roads of about 6m in width. Diesel Batching: aboveground diesel tanks of 33m³ each	x	**Listing Notice 1, Activity 14:** The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. (combined capacity of both facilities).	-	-

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
	(as well as a possible 22m³ tank), a 40m³ API self-bunded tank (Isotainer) for Hydraulic Oil and a 20m³ API self-bunded tank for Lube Oil. A total combined storage of 148m³. - Emulsion 60 tons (similarly 60m³) of Emulsion product underground, with no surface storage being done and, no pipeline inventory. - Feed into pipeline for underground use at both areas. Clearance of indigenous vegetation will be required in the order of approximately 5ha.		Listing Notice 1: Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation (combined clearance). Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 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 (diesel storage area). Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area)		
Project 3: Main Parking Extension					
Extension of existing Main Parking Area by 4 900m² within close proximately (20m) to the Springkaanspruit. No additional specific roads will be required, traffic will be managed within the overall parking bay layout.	Less than 1ha	x	Listing Notice 1: Activity 12: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. Listing Notice 1: Activity 48: The expansion of infrastructure or structures where the physical footprint is expanded by more than 100m2 or more, where such expansion occurs within a watercourse or within 32m of a watercourse.	-	**Section 21(c) & (i) water uses**

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
			Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan (diesel storage area). Listing Notice 3, Activity 14: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.		
Project 4: Widening of Access Road between South Shaft/Main Offices and Plant					
An existing road provides access between the Main Office Buildings and the Plant. The current width of the road ranges between 5m and 6m. The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic. Clearance of indigenous vegetation will be required in the order of approximately 3 311m².	Less than 1ha	x	Listing Notice 1: Activity 48: The expansion of infrastructure or structures where the physical footprint is expanded by more than 100m² or more, where such expansion occurs within a watercourse or within 32m of a watercourse. (This is a potential activity, as the expansion will take place after the existing road crossing over the Springkaanspruit.) Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area). Listing Notice 3: Activity 18: The widening of road by more than 4m, or the lengthening of a road by more than 1km.	-	-
Project 5: Access Crossing between Plant and North Mine					
The mine is planning on constructing a road under the regional road bridge to allow for access between the two areas. Clearance of indigenous vegetation will be required in the order of approximately 1 700m².	Less than 1ha	x	Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area).	-	-

Note: All listed activities presented in italic are included as the specific requirement for these have not been finalised. These will be determined once the final layouts and specialists studies are available.

Aim and Motivation of the Project

Dwarsrivier Mine is serviced by approximately 1200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

In terms of the Fetakgomo-Greater Tubatse Local Municipality Integrated Development Plan (IDP), mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. When one further considers the importance of chrome in the global market it should be noted that according to an article by S&P Global Plats, 6 March 2017 (https://www.platts.com/latest-news/metals/tokyo/strong-chrome-demand-to-hold-but-views-divided-26678512), "strong demand for chromite feedstock of ferrochrome will continue to hold on the back of robust Chinese stainless steel output, but views are divided on whether global supply will move into deficit due to constraints of South African production to meet that demand, industry sources told S&P Global Platts Monday". According to the article, "sources said there are two possible scenarios arising from South Africa trying to meet Chinese demand amid stagnated output: the market will be short on chrome ore supply as other global suppliers will not be able to fully meet China's demand, or China will reduce dependency on South African chromite supply and diversify to other resources." According to the Mining Weekly Online (http://m.miningweekly.com/article/strong-outlook-for-recovering-ferrochrome-industry-merafe-2017-03-08/rep_id:3861): "The Chinese economy, on which the ferrochrome and chrome ore markets are heavily dependent, grew by 6.7% year-on-year, underpinning pleasing growth in stainless steel production. Ferrochrome-using stainless steel production is projected to grow by 3.5% in 2017 and by 3.8% in 2018, which should be followed by increased ferrochrome demand."

Project 1: Khulu Tailings Storage Facility

Dwarsrivier Mine is currently depositing tailings material at the existing North TSF to the east of the mine's Beneficiation Plant, located on the remaining portion (Portion RE) of the Farm Dwarsrivier 372KT. It is anticipated that the existing active North TSF will reach its full capacity sooner than anticipated due to tonnage ramp-ups. The existing North TSF was designed to contain production tonnages for 23 years, with 29 000 tonnes received for the first two (2) years of operation and allowing for a deposition rate of 17 280 tonnes per month for the remaining twenty-one (21) years. The deposited tonnage rate was later revised to allow for deposition of 33 500 tonnes per month for the first two years, which is higher than what was originally designed for and is anticipated to reduce the expected life of the NTSF of 23 years. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years. For this reason additional storage capacity on site is required. The mine therefore proposes the development of a new TSF, to be referred to as the Khulu TSF, in order to accommodate tailings material once the full capacity of the North TSF is reached. In consideration of the above, the overall aim of the proposed activities is to ensure that a well-designed tailings disposal system is operated on site to allow for the production requirements on site.

The mine initially identified seven (7) potential TSF sites, which have since been reduced to three (3) site alternatives, namely Sites B, C and D, with Site B being the most favourable for the mine, based on the findings of the engineering and geotechnical studies. Site F was also considered during the specialist investigations, however, this area was excluded from the future assessments due to the distance from the Plant.

The surface areas and anticipated heights of the proposed Khulu TSF that each of the site alternatives can accommodate are as follows (please take note that the heights are approximate heights at this time and will be subject to further design finalisation):

- Site B: 20ha, 37m high;
- Site C: 28ha, 29m high; and
- Site D: 21ha, 49m high.

Project 2: Diesel and Emulsion Batching

The placement of the diesel and emulsion batching area is developed in line with the underground mining operations. The placement will ensure the opportunity to directly pipe diesel and emulsion to the underground workings without excessive surface pipeline systems, which could lead to spills.

Project 3: Main Parking Extension

This project is purely for logistical purposes. The current parking area is about 0.8ha with the parking bays not sufficient to cater for the number of vehicles. The current parking bay comprises of a paved surface area and steel roof parking bays. The same principle will be applied at the extended area. No new entrances will be required.

Project 4: Widening of Access Road between South Shaft/Main Offices and Plant

This project is purely for safety and logistical purposes. The purpose is to improve the safe operation of traffic on this road.

Project 5: Access Crossing between Plant and North Mine

This project is purely for logistical purposes. In order to ensure more optimal logistical management of traffic between the South Mine and the North Mine, and to reduce the number of vehicles on the regional road, the mine is planning on construction a road under the regional road bridge to allow for access between the two areas.

Alternatives Considered

Alternatives which will be assessed as part of the EIA Phase will be:

- Location of the TSF;
- TSF Deposition Technology; and
- No go alternatives (i.e. should the projects not be approved).

Based on the outcomes of the site selection currently undertaken for the purposes of this Environmental Scoping Report (ESR), Site (TSF Option) B presents as the most feasible location alternative.

With the current North TSF reaching its life of mine, a new facility is required to ensure ongoing mining and processing practices. Without this facility, the mine will not be able to continue with beneficiation processes and the primary mining activities. This will result in a severe loss of the beneficiation of chrome and optimal mining of chrome in terms of the approved Mining Works Programme, income to this local municipality, loss of employment opportunities, and loss of opportunities in terms of the Social and Labour Plan, as well as contributions the mine is making into the Local Municipality.

The other Capital Projects are required for the safe and logistically efficient operation of the mining operations.

Application and Consultation Process

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources and Energy (DMRE) on 13 July 2021. A letter of acknowledgement from the DMR must be issued within 10 days from the submission of the application (22 July 2021), at the time of compiling this draft report the acknowledgement was not received, but proof of delivery is available. Once the application was submitted the stakeholder consultation process was initiated with the following steps:

- Identification of existing stakeholders on the existing database;
- In accordance with GNR 982 Section 41(2)(a-b) a site notice was developed and placed at three locations, in order to inform surrounding communities and adjacent landowners of the proposed project, the site was placed on 15 July 2021) and at visible locations close to the site.
- Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail and fax through the submission of the Background Information Document and Registration Sheet:
    - Authorities;
    - Municipalities;
    - Residential Associations;
    - Non-governmental organisations;
    - General Public;
    - Parastatals / Service providers, and
    - Adjacent Landowners.
- In accordance with GN. R 982 41(2)(c) of Chapter 6 an advert was placed in the Steelburger Newspaper on 15 July 2021.

The Draft ESR will be made available to all registered stakeholders from 23 July 2021 to 23 August 2021. A period of 30 days will be awarded for comments during the Scoping Phase. Once the comments have been received these will be included into the final ESR, which will be submitted to the Competent Authority, the DMRE, for consideration, prior to initiating the EIA process.

Key Potential impacts

The following key potential impacts are foreseen and will be assessed in more detail during the EIA phase:

- Impact on water resources due to the proximity of the activities located near drainage lines;
- Impact on potential wetlands;
- Impact on surrounding mining activities and infrastructure due to the undertaking of activities on the surface rights of other mines;
- Impact on heritage resources, should these be identified;
- Loss of soils and the impact on land capability; and
- Impact on a sensitive ecological system if not well managed.

Gaps

This document serves as the Draft ESR. Detailed specialist studies are still to be undertaken which will provide more detail in terms of the layout of infrastructure and the implementation of activities.

Plan of Study for EIA

The Draft ESR was made available for comment to all registered stakeholders from 23 July 2021 to 23 August 2021. It is planned to submit the draft EIA by end September 2021.

The aspects of the project that will be assessed in the EIA phase are those considered by the EAP as having the potential to result in environmental and social impacts. They include:

- Clearing of vegetation in an area regarded as sensitive;
- Proximity of activities to watercourses in the area;
- Removal of topsoil and the associated loss thereof in an area which has a negative topsoil balance;
- Impact on animals along the current open spaces;
- Release of dust due to clearance activities;
- Impact on the quality and quantity of water resources; and
- Loss of heritage resources in an area not currently assess for this purpose.

The various projects which will therefore be considered will be the:

- Development of roads (permanent and temporary);
- Development and upgrade of infrastructure;
- Development and operation of the TSF; and
- Development and operation of diesel storage and supply areas.

Specialist studies will be undertaken to determine the impact and potential flaws of the projects within the current environmental setting. Note that the specialist studies will also make recommendations to the amendment of activity layouts should these be required. The following specialist studies will be undertaken:

- Phase 1 Heritage Assessment and Paleontological Assessment;
- Hydrological assessment to determine the relevant flood lines;
- Hydrogeological Assessment;
- Terrestrial Biodiversity Study;
- Freshwater Ecology Study;
- Visual Impact Assessment;
- Air Quality Assessment
- Soil and Land Capability Study; and
- Update of the mine's overall Water Balance.

Contents Page

List of Figures

List of Tables

List of Graphs

List of Annexures

Annexure 1: DMR Acknowledgment of Receipt
Annexure 2: EAP Curriculum Vitae
Annexure 3: Title Deeds
Annexure 4: Stakeholder Consultation Records
Annexure 5: Site Selection Report, with specialist studies

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

Draft ENVIRONMENTAL SCOPING REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH MINING RIGHT AND/OR BULK SAMPLING ACTIVITIES INCLUDING TRENCHING IN CASES OF ALLUVIAL DIAMOND PROSPECTING.

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

NAME OF APPLICANT:	**Dwarsrivier Chrome Mine (Pty) Ltd**
TEL NO:	**+27 (0) 13 230 5300**
FAX NO:	**+27 (0) 13) 230 5318**
POSTAL ADDRESS:	**PO Box 567, Lydenburg, 1120**
PHYSICAL ADDRESS:	**Dwarsrivier Farm 372KT, Sekhukhune Road, Steelpoort Area, 1133**
FILE REFERENCE NUMBER SAMRAD:	**Mining Right Reference Number: LP 30//2/3/2/1(179) EM**

IMPORTANT NOTICE

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

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

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

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

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

OBJECTIVE OF THE SCOPING PROCESS

1) The objective of the scoping process is to, through a consultative process—

- identify the relevant policies and legislation relevant to the activity;
- motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of 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;
- identify the key issues to be addressed in the assessment phase;
- 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
- 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.

SCOPING REPORT

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources and Energy (DMRE) on 13 July 2021. A letter of acknowledgement from the DMRE should be granted 10 days from submission of the application (22 July 2021), at the time of compiling this draft report the acknowledgement was not received, but proof of delivery is available.

Please refer to Annexure 1 for the submitted application form and proof of submission.

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.a Details

1.a.i Details of the Environmental Assessment Practitioner (EAP)

Table 1: Details of EAP

Name	Tanja Bekker
Designation	Environmental Assessment Practitioner
Postal Address	PO Box 22014, Helderkruin, 1733
Physical Address	21 Gladiolus Street, Roodekrans, 1724
Telephone Number	+27 (0) 82 412 1799
Cell Phone Number	+27 (0) 82 412 1799
Fax Number:	+ 27 (0) 86 551 5233
Email Address	tanja@envirogistics.co.za

1.a.ii Expertise of the EAP

The following table presents a summary of the Environmental Assessment Practitioner's (EAP) experience:

Table 2: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU, now Johannesburg University)	Registered member of the Environmental Assessment Practitioners Association of South Africa (EAPASA; Reg No. 306/2019) Registered with the South African Council of National Scientific Professions (SACNASP: Pr.Sci.Nat. Reg No. 400198/09) Member of International Association of Impact Assessors (IAIA) Member of the Environmental Law Association of South Africa	19 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

M.Sc. Environmental Management - RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)

Career Enhancing Courses

ISO 14000 Lead Auditors Course (WTH Management)
Certificate in Project Management (Pretoria University)
Management Advance Programme (MAP 81) (Wits Business School)

Professional Affiliations

Certified member of Environmental Assessment Practitioners Association of South Africa
Certified ISO 14001 Environmental Management System Auditor
Registered as a Professional Natural Scientist,
Member of the South African affiliate of the International Association for Impact Assessment
Member of the Environmental Law Association of South Africa (ELA).

Summary of the EAP's past experience

Ms. Bekker is registered as a Professional Natural Scientist in the field of Environmental Science with the South African Council for Natural Scientific Professions (SACNASP) and is also a Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA), a legal requirement stipulated by the National Environmental Management Act, 1998 (NEMA). She is further certified as an ISO 14001 Lead Auditor. Her qualifications include BSc. Earth Sciences (Geology and Geography), BSc. Hons. Geography, and MSc. Environmental Management. In addition to these tertiary qualifications, she obtained a Certificate in Project Management, and completed the Management Advancement Programme at Wits Business School.

With more than 19 years' working experience in environmental management and the consulting industry and managing various Large Account Clients, she understands the South African Regulatory System, and can advise clients with due diligence on their environmental regulatory requirements and offer a solution driven service to their project life cycle. She is equipped with exceptional project management and coordination skills, which especially enhances the service she offers clients within the environmental permitting system.

Her key focus is environmental management and compliance with extensive experience in the mining industry. Project Management and Coordination of projects form a critical component of her duties, which include project planning, initiation of projects, client, authority and stakeholder consultation, specialist coordination, budget control, process control, quality control and timeframe management. Her interest lies in a client advisory capacity, being involved during due diligence investigations, pre-project development and assisting the client and engineering team in adding value to develop the project in an environmentally sustainable manner, considering client costs and liabilities, as well as considering the implication of environmental authorisation conditions and requirements on project deliverables. Her involvement in projects has spanned over the project life cycle from Due Diligence Investigations, Pre-Feasibility Investigations, Prospecting Right Applications, Mining Right Applications, Environmental Reporting and implementation and auditing of Environmental Management Plans and Authorisations.

1.a.iii Details of the Applicant

Dwarsrivier Chrome Mine (Pty) Ltd (hereafter referred to as “Dwarsrivier Mine”) is wholly owned by Assore Ltd (“Assore”).

According to information obtained from the official Dwarsrivier Mine Web Page, the mine originated as a result of neighbouring properties to the north and south thereof, which had existing chrome mining operations at the time of purchase in 1998. The owners of Dwarsrivier Mine, therefore invested in a feasibility study for the Plant, old Tailings Storage Facility (hereafter referred to as the “old TSF”) and the mining of chrome. The designs for the opencast and underground mines then commenced. Approval to proceed with the final design and construction of work was given in July 1999 (http://www.assmang.co.za/chrome.asp). The mine ceased opencast operations in 2006 and is currently operating as an underground (trackless, board and pillar operation) mine, producing chromite ore, with a Dense Medium Separation and Spiral Beneficiation Plant. Dwarsrivier Mine currently produces approximately 200 000 tons of chromite ore per month.

The mine was previously owned by Assmang (Pty) Ltd (“Assmang”) with a 50% share. This results from the approval by the Department of Mineral Resources and Energy (DMRE) of the Section 11 Transfer in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) of Dwarsrivier Mine from African Rainbow Minerals (ARM) to Assore. The change of ownership officially came into effect on 1 August 2016. All Environmental Authorisations and Waste Management Licences (WMLs) were transferred with approval issued by the Competent Authority (Department of Mineral Resources and Energy) (DMRE) during May 2019. Currently the Water Use Licence, 2008 (WUL, 2008) has also been transferred to Dwarsrivier Chrome Mine, with the WUL, 2011 and WUL, 2013 amendments currently pending.

Table 3: Details of Applicant

Project applicant:	Dwarsrivier Chrome Mine (Pty) Ltd
Registration no (if any):	2011/105280/07
Trading name (if any):	N/A
Responsible Person, (e.g. Director, CEO, etc.):	Environmental Representative
Contact person:	Mr Pieter Schoeman
Physical address:	The mine is situated 25km outside of Steelpoort on Portion 1 (Remaining Extent) and Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT and Portion 4 (a Portion of Portion 3) of the Farm De Grooteboom 373KT

Postal address:	PO Box 567, Lydenburg		
Postal code:	1120	Cell:	+27 (0) 076 028 7680
Telephone:	+27 (0) 13 230 5300	Fax:	+27 (0) 013 230 5318
E-mail:	pieters@dwarsrivier.co.za		

1.a.iv Environmental Authorisations

The mine is operating with all required environmental authorisations in terms of the following:

Table 4: List of Environmental Authorisations

#	Legislation	Licence	Reference	Date
1	Minerals Act, 1991	Approval for Dwarsrivier Phase II Chrome Project	OT6/2/2/426A	14 December 1999
2	NWA	Regulation 4b (GN704) Exemption for undermining 2006	16/2/7/B400/C83/1	12 September 2006 (no longer applicable, replaced by the WUL, 2008)
3	NWA	Overall Water Use Licence (WUL)	16/2/7/B400/C83	21 January 2008, updated 10 June 2021
4	MPRDA	Environmental Management Programme	-	December 2010
5	NWA	WUL – Tailings Dam	04/B41G/G/792	8 July 2011
6	National Environmental Management Act, 1998 (NEMA)	Environmental Authorisation for the proposed construction of a new Tailings Storage Facility	12/1/9-7/1e/GS4	9 July 2011
7	National Environmental Management: Waste Act, 2008 (NEMWA)	Waste Licence – Hazardous Waste Temporary Storage Facilities[1]	12/9/11/L290/5	21 July 2011
8	MPRDA	Dwarsrivier Mine Tailings Storage Facility Environmental Management Programme	LP30/5/1/3/2/1(179)EM	22 August 2011
9	MPRDA	Approval for Three Plants	LP30/5/1/3/2/1 (179)EM	11 January 2012
10	NEMWA	Waste Licence – Temporary General Waste Storage Facilities	12/4/10-A/1/GS3	29 March 2012
11	NEMA	Construction of a Low-Level Bridge over the Groot Dwarsrivier	12/1/9/1-GS22	11 June 2012
12	NEMA	Environmental Permission for Construction of a Bridge over the Springkaanspruit River	12/1/9/1-GS62	19 September 2013
13	NWA	WUL – River Crossings	04/B41G/CI/2240	4 October 2013
14	NEMA	Section 24G Rectification	12/1/9-7/S24G/7-GS1	26 August 2014
15	NEMWA & NEMA (audited as part of this NEMA audit report, 2020)	Integrated Environmental Authorisation	179EM (2018)	15 February 2018
16	NEMA	Integrated Environmental Authorisation	179EM (2019)	29 May 2019
17	NEMA	Centralised Store	179EM	15 March 2021*

Copies of the Environmental Authorisations are available from Dwarsrivier Mine.

1.b Description of the Property

1.b.i Location of the Mine

Dwarsrivier Mine is situated approximately 60km northwest of Lydenburg, 25km south of Steelpoort and 63km northeast of Roossenekal in the Limpopo Province. The mine currently holds the surface rights for Portion 1 (Remaining Extent (RE)) and Portion 0 (RE) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grooteboom 373KT.

The operation is located in the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhune District Municipality.

[1] Note that the licence holder has not and will not be commissioning the activity. The Environmental Authorisation has therefore not been implemented on site. The Licence Holder is not in contravention with the Environmental Authorisation.

The R577 roadway that connects to the R555 (Lydenburg-Roossenekal road), is situated to the north of the Plant and mine offices. The overall area is characterised by intensive mining development. Various servitudes traversing the site are present, which include gravel roads, telephone lines and electricity lines. Please refer to Figure 1 illustrating the location of the proposed TSF site alternatives in relation to the Dwarsrivier Mine and Figure 4 for the cadastral setting of the mine.

Dwarsrivier Mine falls in the quaternary catchments B41G and B41H in the Olifants Water Management Area (WMA 4). All surface water draining from the properties ultimately flows into the Groot Dwarsrivier and the Klein Dwarsrivier, the confluence of which is located on north-western portion of the property. From the confluence, the Dwarsrivier flows northwards into the Steelpoort River. Dwarsrivier Mine has an exemption (Reference Number 16/2/7/B400/C83/1) from the then Department of Water Affairs (DWA), now the Department of Water and Sanitation (DWS), which allows the operation to undermine the Groot Dwarsrivier.

Several of the neighbouring farms, namely Tweefontein 380JT, Thorncliffe 374KT, De Grooteboom 373KT and Dwarsrivier 372KT are owned by mining houses with existing and operational chrome and platinum mines. On the remainder of the neighbouring farms, agricultural activities take place in the form of stock grazing and the production of vegetables, lucerne and cotton.

Please refer to the following table for the registered name, administrative jurisdiction and summary of location of the TSF site alternatives (Options B, C, and D).

Table 5: Property Information

Farm Name:	• Farm Dwarsrivier 372KT RE:
	  ○ TSF Option B
	  ○ TSF Option D
	• Farm Dwarsrivier 372KT RE of Portion 1:
	  ○ TSF Option C
	• Farm Dwarsrivier 372KT Portion 6:
	  ○ Proposed Return Water Dam (RWD) for TSF Option B

Magisterial district:	The mine falls within the Fetakgomo Tubatse Local Municipality, within the boundaries of the Sekhukhu District Municipality.
Distance and direction from nearest town:	Dwarsrivier Mine is situated approximately 25km southwest of Steelpoort and 60km from Lydenburg on the border between Limpopo and Mpumalanga Provinces. The mine itself falls under the jurisdiction of the Limpopo Province.
21 digit Surveyor General Code for each farm portion:	• Farm Dwarsrivier 372KT RE - T0KT00000000037200000 • Farm Dwarsrivier 372KT RE of Portion 1 - T0KT00000000037200001 • Farm Dwarsrivier 372KT Portion 6 - T0KT00000000037200006

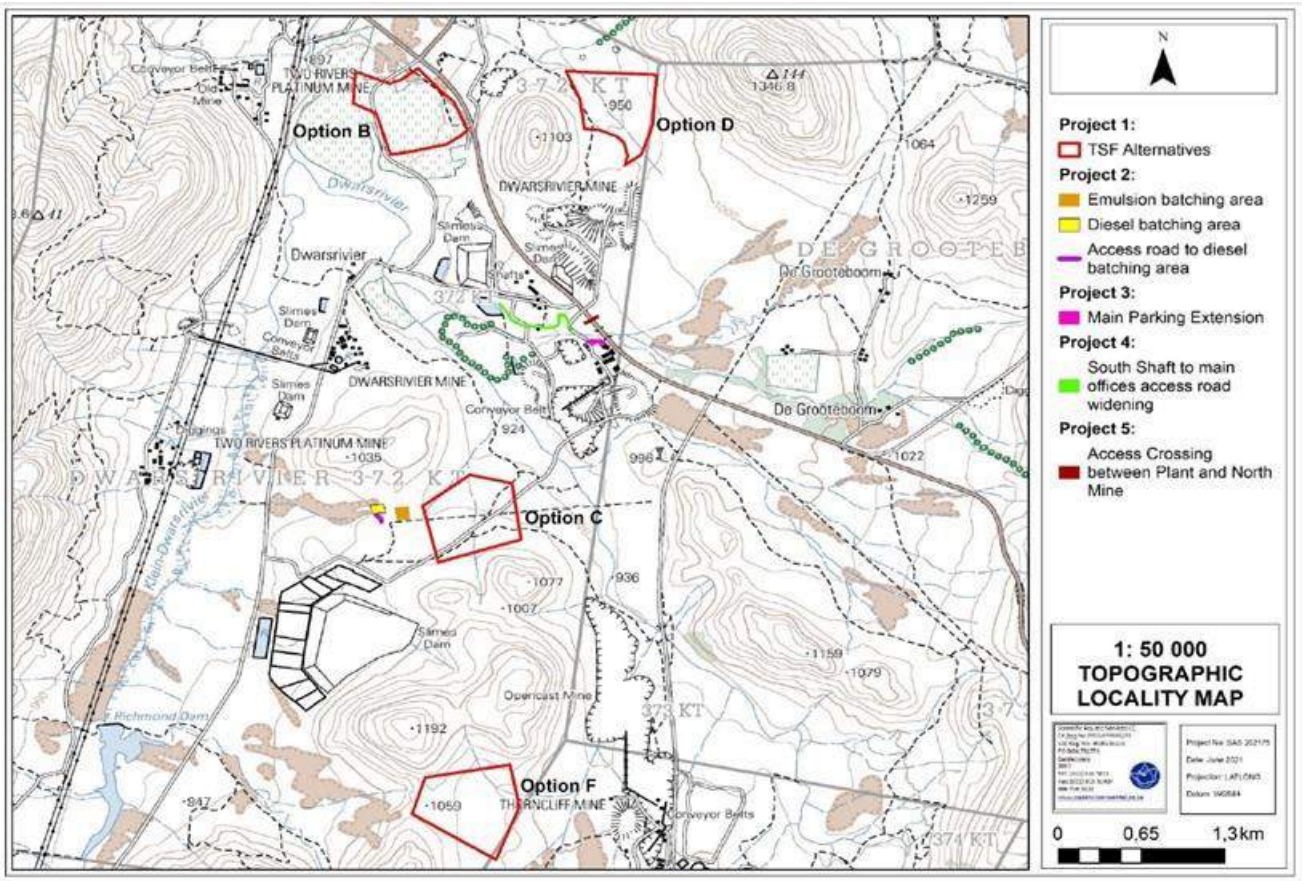


Figure 1: Local and Regional Setting of the surface operations

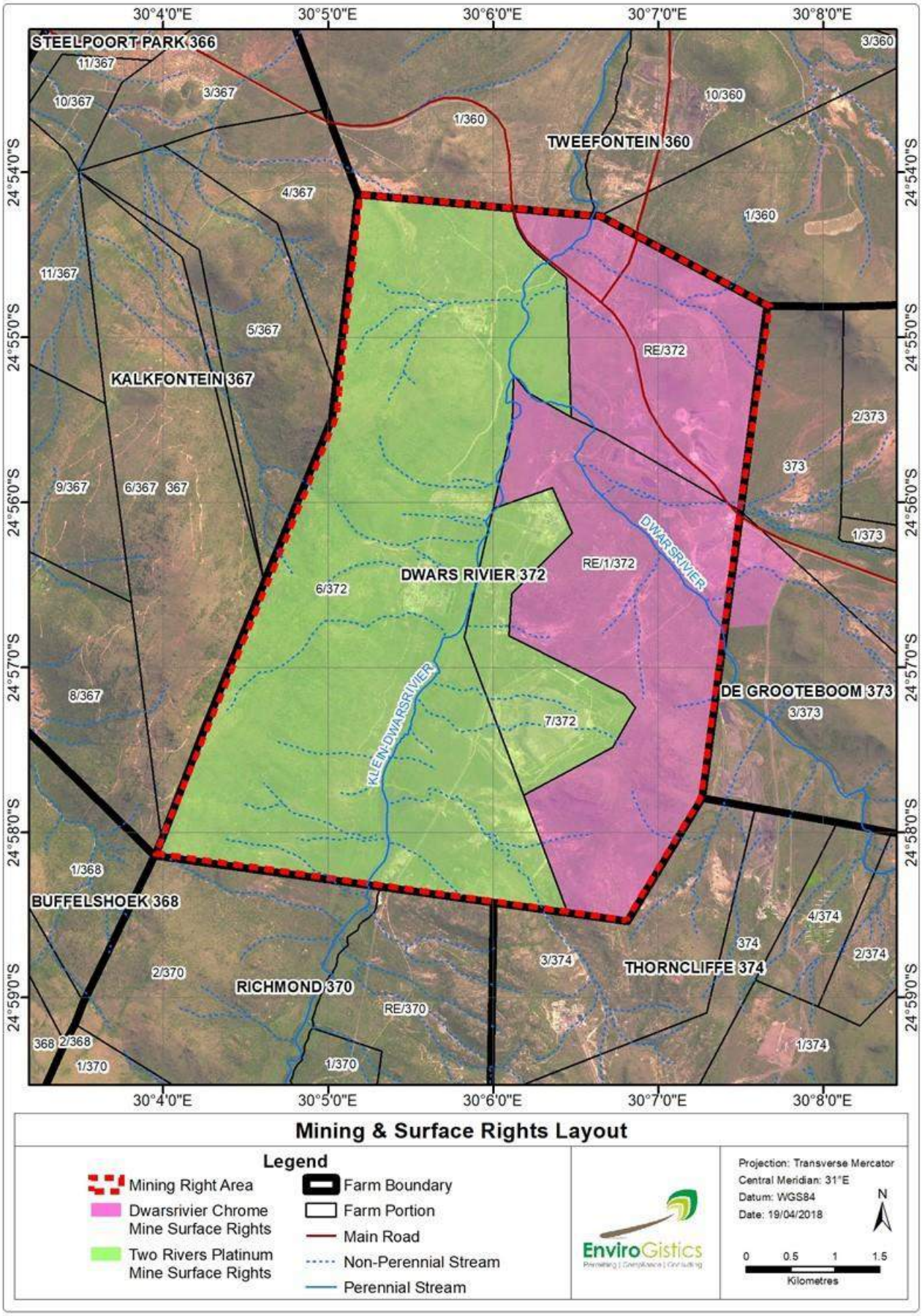


Figure 2: Cadastral Information

1.b.ii Ownership of Land

Dwarsrivier Mine has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six (6) opencast pits have subsequently been mined out and backfilled with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042.

Assmang bought the farm Dwarsrivier 372KT (Portion 1 and the Remaining Extent), including all surface and mineral rights, in October 1998 for R163 million. In 2002, the mine purchased a portion of the farm De Grooteboom 373KT, subdividing this portion into Portion 4 (a portion of Portion 3).

The mine holds the surface rights on Portion 0 (Remaining Extent) and Portion 1 (Remaining Extent) of the farm Dwarsrivier 372KT and Portion 4 (a Portion of Portion 3) of the farm De Grooteboom 373KT. The mining rights are held over Portion 0 (Remaining Extent), Portion 1 (Remaining Extent), Portion 6 and Portion 7 of the farm Dwarsrivier 372KT. The surface rights of Portions 6 and 7 of the farm Dwarsrivier 372KT are owned by Two Rivers Platinum Mine.

The property details are presented in the following table:

Table 6: Landownership

Farm Name	Portion	Title Deed Number	Property Size	Ownership	Mining Rights
Dwarsrivier 372KT	0 (RE)	T24/2021	489.1915ha	Dwarsrivier Chrome Mine (Pty) Ltd	Dwarsrivier Chrome Mine (Pty) Ltd
Dwarsrivier 372KT	1	T24/2021	842.6880ha	Dwarsrivier Chrome Mine (Pty) Ltd	Dwarsrivier Chrome Mine (Pty) Ltd
De Grooteboom 373KT	Portion 4 (a Portion of Portion 3)	T24/2021	52,1993ha	Dwarsrivier Chrome Mine (Pty) Ltd	Dwarsrivier Chrome Mine (Pty) Ltd
Dwarsrivier 372KT	6	48140/2005PTA	1878.9867ha	Two Rivers Platinum (Pty) Ltd	Assore Ltd
Dwarsrivier 372KT	7	T9520/2008PTA	260.7750ha	Two Rivers Platinum (Pty) Ltd	Assore Ltd

1.c Locality Map

Figure 1 present the location of the activities being applied for within the approved mine surface rights as described in the following table. Please refer to Figure 1 for the local setting of the site.

Table 7: Location of Listed Activities

Farm Name and associated activities:	• Farm Dwarsrivier 372KT RE:
	  ○ TSF Option B (Project 1)
	  ○ TSF Option D (Project 1)
	  ○ Plant to North Mine road crossing (Project 5)
	• Farm Dwarsrivier 372KT Remainder of Portion 1:
	  ○ TSF Option C (Project 1)
	  ○ TSF Option F (Project 1)
	  ○ Diesel and Emulsion Batching (Project 2)
	  ○ Main Parking Extension (Project 3)
	  ○ Road Widening (Project 4)
	• Farm Dwarsrivier 372KT Portion 6:
	  ○ Proposed Return Water Dam (RWD) for Option B (Project 1)

Application area (hectares)	• Project 1 – Khulu TSF
	  ○ Farm Dwarsrivier 372KT RE (TSF and ancillary infrastructure):
	  ▪ TSF Option B: 20ha (preferred)
	  ▪ TSF Option D: 21ha
	  ○ Farm Dwarsrivier 372KT Remainder of Portion 1:
	  ▪ TSF Option C: 28ha
	  ○ Farm Dwarsrivier 372KT Remainder of Portion 6 (location can still change to Dwarsrivier 372KT RE):
	  ▪ Proposed Return Water Dam for Option B: 1.7ha
	• Project 2 – Diesel and Emulsion Batching
	  ○ Farm Dwarsrivier 372KT Remainder of Portion 1: 1.6ha
	  ▪ Emulsion Batching: 1.6ha

	▪ Diesel Batching: 3ha (clearance of about 0.37ha) ▪ Emulsion Batching Access Road: 80m at 6m width: 0.048ha (480m^2) (clearance of about 480m^2) ▪ Diesel Batching Access Road: 55m at 6m width: 0.033ha (330m^2) – no (no clearance, existing road will be used) • Project 3 – Extension of Main Parking Area o Farm Dwarsrivier 372KT Remainder of Portion 1: 0.5ha • Project 4 - Widening of Access Road between South Shaft/Main Offices and Plant o Mainly on Farm Dwarsrivier 372KT Remainder of Portion 1: 0.3ha • Project 5: Access Crossing between Plant and North Mine o Farm Dwarsrivier 372KT RE: 0.2ha
Overall Project Area	Maximum area of 30ha (when including roads, pipelines, etc.)

1.d Description of the Scope of the Proposed Activity

It is the intention of Dwarsrivier Mine to initiate certain additional infrastructure and activities on site. These will include:

- Project 1: Khulu TSF Project;
- Project 2: Diesel and Emulsion Batching;
- Project 3: Main Parking Extension;
- Project 4: Widening of access road between South Shaft/Main Offices and Plant; and
- Project 5: Access Crossing between Plant and North Mine.

1.d.i Listed Activity Location and Size (also considering other Environmental Legislation)

1.d.i.1 National Environmental Management Act, 1998 (NEMA)

In terms of the NEMA, there are three (3) listing notices which should be considered for this application. These listing notices were amended during April 2017. Listing Notice 1 (Regulation 983) activities require a Basic Assessment Process, whereas Listing Notice 2 (Regulation 984) activities require a full Environmental Impact Assessment (EIA) Process. Listing Notice 3 (Regulation 985) activities require a Basic Assessment Process if the area falls within certain geographic zones. The majority of the Dwarsrivier Mine is located in a Critical Biodiversity Area 1 (CBA1) with small portion thereof falling within Ecological Support Areas 2 (ESA2), while certain areas are also located within a threatened ecosystem, namely the Sekhukhuneland Mountainlands ecosystem, which is listed as being endangered. Therefore Listing Notice 3 is applicable when considering infrastructure and activities planned on site.

1.d.i.2 National Heritage Resources Act, 1999 (NHRA)

For this project, the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is of importance and the following sites and features are protected:

a) Archaeological artefacts, structures and sites older than 100 years;
b) Ethnographic art objects (e.g. prehistoric rock art) and ethnography;
c) Objects of decorative and visual arts;
d) Military objects, structures and sites older than 75 years;
e) Historical objects, structures and sites older than 60 years;
f) Proclaimed heritage sites;
g) Grave yards and graves older than 60 years;
h) Meteorites and fossils; and
i) Objects, structures and sites or scientific or technological value.

The national estate includes the following:

a) Places, buildings, structures and equipment of cultural significance;
b) Places to which oral traditions are attached or which are associated with living heritage;
c) Historical settlements and townscapes;
d) Landscapes and features of cultural significance;
e) Geological sites of scientific or cultural importance;
f) Archaeological and palaeontological importance;
g) Graves and burial grounds;
h) Sites of significance relating to the history of slavery; and
i) Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books, etc.).

Section 34 of the NHRA deals with structures that are older than 60 years. Section 35(4) of the NHRA deals with archaeology, palaeontology and meteorites. Section 36 of the NHRA, deal with human remains older than 60 years. Unidentified/unknown graves are also handled as older than 60 years until proven otherwise.

According to Regulation 38 of the NHRA, any development or other activity which will change the character of a site exceeding 5 000m^2 in extent requires notification to the South African Heritage Resources Agency (SAHRA).

1.d.i.3 National Environmental Management: Waste Act, 2008 (NEMWA)

NEMWA, Regulation 921, dated 29 November 2013 and as amended, makes provision for lists of waste management activities that have, or are likely to have a detrimental effect on the environment.

The establishment of a Mine Residue Deposit forms part of activities for which a Waste Management Licence (WML) is required.

1.d.i.4 National Water Act, 1998 (NWA)

Chapter 4 of the NWA specifically addresses the use of water and is a tool for an authority to ensure the implementation of the principle that National Government has overall responsibility over water resource management, including the equitable allocation and beneficial use of water in the public interest, including that a person can only be entitled to use water if the use is permissible under the Act. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. Section 21 of the NWA identifies eleven (11) consumptive and non-consumptive water uses which must be authorised.

The activities associated with this project will trigger Water Use Licenses (WULs).

The activities in question and a brief location description are presented in the following table:

Table 8: Listed Activities

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
Project 1					
Construction and operation of the new Khulu TSF	Option B: 20ha Option C: 28ha; Option D: 21ha	x	**Listing Notice 1, Activity 12** (specific should Option D be selected, which may result in a non perennial river diversions; potential river crossings will also be associated with Option C; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1, Activity 19** (specific should Option D be selected; potential river crossings will also be associated with Option C; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): 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. **Listing Notice 2, Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **Listing Notice 3, Activity 14** (specific should Option D be selected; potential river crossings will also be associated with Option C; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	**Regulation 921, as amended by Regulation 633 dated 24 July 2015:** **Waste Management Activity, Category B, Activity 11**: 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).	**Section 21(g) water uses**
Construction and operation of associated infrastructure – Return Water Dam	This facility will form part of the overall TSF footprint as presented above – and will be finalised once the preferred	x	**Listing Notice 1, Activity 12** (specific should Option D be selected; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): The development of- (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres (ii) infrastructure or structures with a physical footprint of 100 square metres or more;	-	**Section 21(g) water uses**

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985)* *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
	site has been selected, but could be in the region of 2ha.		where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1, Activity 13**: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more (depending on the Return Water Dam requirements). **Listing Notice 1, Activity 19** (specific should Option D be selected; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): 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. **Listing Notice 2, Activity 6**: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. – this activity is triggered as the proposed dam would require approval in terms of a new Water Use (Section 21(g)) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). **Listing Notice 2, Activity 16** (this will be dependent on the size and design of the Return Water Dam – and is currently not foreseen likely as it is planned to design the RWD below NWA dam safety thresholds): The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5m or higher or where the high water mark of the dam overs an area of 10ha or more. **Listing Notice 3, Activity 14** (specific should Option D be selected; **and in the event that Site B is located in the alluvial aquifer and identified as a watercourse**): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.		

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985)* *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
Construction and operation of pipelines	Approximate lengths to be finalised during the EIA Phase: Option B: 1.5km; Option C: 2km; Option D: 1.5km	x	**Listing Notice 1, Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 14** (should river crossings of pipelines be required – potentially for Option C): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	-	**Section 21(c) & (i) water uses (depending on which TSF Option is selected)**
Establishment of laydown areas and temporary offices	This will be a temporary site, within the footprint of the TSF demarcated area.	x	**Listing Notice 3, Activity 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 (if applicable). It is not foreseen that any reservoirs in excess of 250m³ will be constructed for the purposes of any of the activities.	-	-
Construction of roads	Approximate lengths to be finalised during the EIA Phase: Option B: 1.5km; Option C: 2km; Option D: 1.5km	x	**Listing Notice 1: Activity 12** (specific should Option D and potentially Option C be selected): The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1: Activity 19** (specific should Option D and potentially Option C be selected)**:** 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.	-	**Section 21(c) & (i) water uses (depending on which TSF Option is selected)**

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985)* *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
			Listing Notice 1, Activity 24: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Listing Notice 3, Activity 14 (specific should Option D and potentially Option C be chosen): The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.		
Construction of a Topsoil Stockpile	Less than 1ha	x	Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. This area will be placed outside of a 1:100year flood line.	-	-
Project 2: Diesel and Emulsion Batching					
Dispatching of diesel and emulsion to the underground via pipelines.	• 80m and 50m access roads of about 6m in width. • Diesel Batching: aboveground diesel tanks of 33m³ each (as well as a possible 22m³ tank), a 40m³ API self-bunded tank (Isotainer) for Hydraulic Oil and a 20m³ API	x	Listing Notice 1, Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. (combined capacity of both facilities). Listing Notice 1: Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation (combined clearance). Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 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	-	-

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
	self-bunded tank for Lube Oil. A total combined storage of 148m³. • Emulsion 60 tons (similarly 60m³) of Emulsion product underground, with no surface storage being done and, no pipeline inventory. • Feed into pipeline for underground use at both areas. Clearance of indigenous vegetation will be required in the order of approximately 5ha.		combined capacity of 30 but not exceeding 80 cubic metres (diesel storage area). Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area)		
Project 3: Main Parking Extension					
Extension of existing Main Parking Area by 4 900m² within close proximately (20m) to the Springkaanspruit. No additional specific roads will be required, traffic will be managed within the overall parking bay layout.	Less than 1ha	x	Listing Notice 1: Activity 12: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. Listing Notice 1: Activity 48: The expansion of infrastructure or structures where the physical footprint is expanded by more than	-	Section 21(c) & (i) water uses

NAME OF ACTIVITY	Aerial extent of the Activity (Ha or m²)	LISTED ACTIVITY	APPLICABLE LISTING NOTICE (*GNR 983, GNR 984 or GNR 985*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA area.*	WASTE MANAGEMENT AUTHORISATION	WATER USES
			100m2 or more, where such expansion occurs within a watercourse or within 32m of a watercourse. Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan (diesel storage area). Listing Notice 3, Activity 14: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.		
Project 4: Widening of Access Road between South Shaft/Main Offices and Plant					
An existing road provides access between the Main Office Buildings and the Plant. The current width of the road ranges between 5m and 6m. The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic. Clearance of indigenous vegetation will be required in the order of approximately 3 311m².	Less than 1ha	x	Listing Notice 1: Activity 48: The expansion of infrastructure or structures where the physical footprint is expanded by more than 100m² or more, where such expansion occurs within a watercourse or within 32m of a watercourse. (This is a potential activity, as the expansion will take place after the existing road crossing over the Springkaanspruit.) Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area). Listing Notice 3: Activity 18: The widening of road by more than 4m, or the lengthening of a road by more than 1km.	-	-
Project 5: Access Crossing between Plant and North Mine					
The mine is planning on constructing a road under the regional road bridge to allow for access between the two areas. Clearance of indigenous vegetation will be required in the order of approximately 1 700m².	Less than 1ha	x	Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (diesel storage area).	-	-

Note: Listed activities presented will be confirmed as part of the specialist studies.

1.d.ii Description of the Activities to be Undertaken

1.d.ii.1 Project 1: Khulu TSF

Dwarsrivier Mine is currently depositing tailings at the existing North TSF, east of the Beneficiation Plant, on Portion RE of the Farm Dwarsrivier 372KT. The North TSF was designed to contain production tonnages for 23 years, with 29 000 tonnes for the first two (2) years of operation and the remaining twenty one (21) years at a deposition rate of 17 280 tonnes per month. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years. For this reason, additional storage capacity on site is required.

The mine initially identified seven (7) potential TSF sites, which have since been reduced to three (3) site alternatives (Sites B, C and D), with Site B being the most favourable for the mine. The extent and the current anticipated heights of the proposed TSF to be accommodated by each site alternative under consideration are as follows:

- Site (TSF Option) B: 20 ha, 37m high;
- Site (TSF Option) C: 28ha, 29m high; and
- Site (TSF Option) D: 21ha, 49m high.

The heights currently anticipated of each of the facilities will be 37m, 29m, and 49m, respectively. The project will not involve typical tailings deposition techniques, but will involve the piping of tailings to a filter press facility from where the filter cake will be trucked to the new TSF. An operating of about 20 years is currently considered as part of the design. The following figure illustrates the initial four (4) sites which will be subjected to a site selection process, but was reduce to three (3) options from the Site Selection (Site C, B and D).

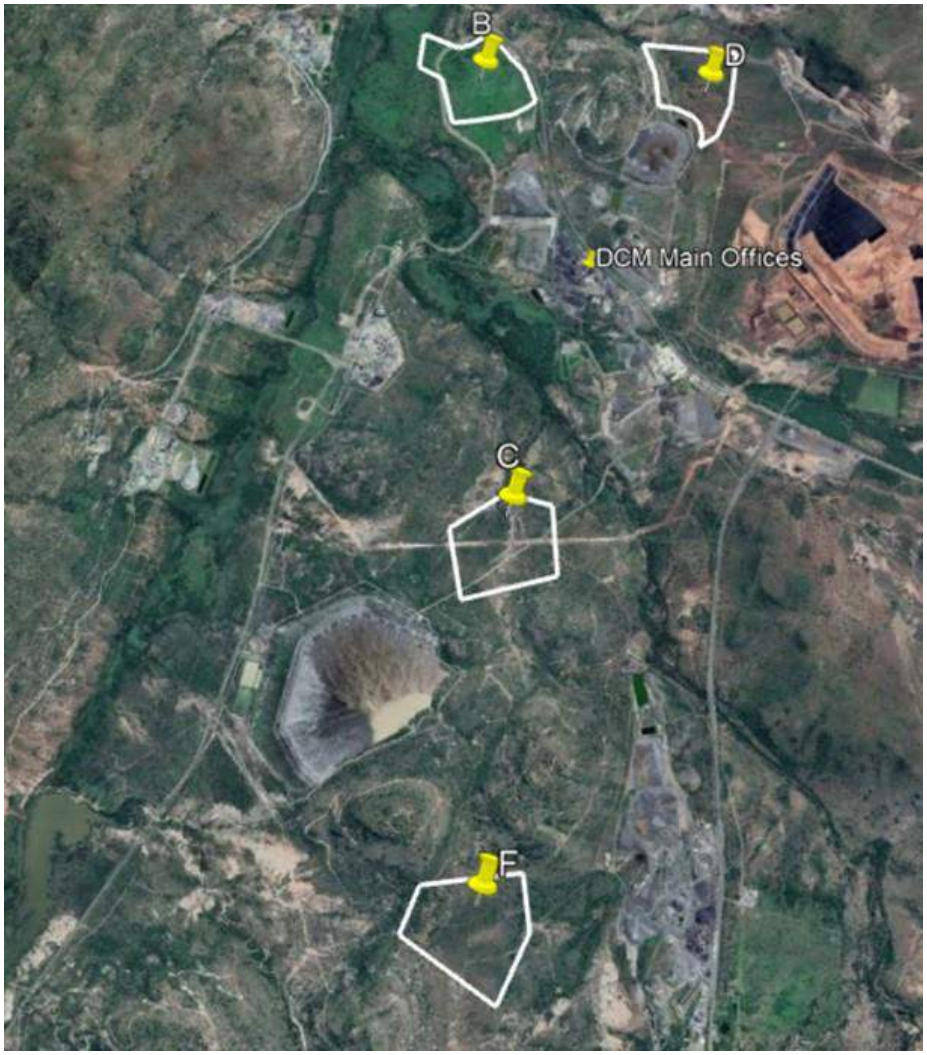


Figure 3: Sites (TSF Options) subjected to initial site selection by the applicant

Please refer to the following table for details regarding this project:

Table 9: Khulu TSF and associated infrastructure

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
TSF Option B				
TSF	20ha	Height: 37m	24°55'3.57"S 30° 6'38.21"E	**Listing Notice 2, Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **Listing Notice 3, Activity 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 (if applicable). **Regulation 921, as amended by Regulation 633 dated 24 July 2015: Waste Management Activity, Category B, Activity 11**: 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). **National Water Act, 1998:** Section 21(g) water use
RWD	2ha (clearance included as part of overall TSF activity)	To be determined.		**Listing Notice 1, Activity 13**: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more (depending on the Return Water Dam requirements). **Listing Notice 2, Activity 6**: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. – this activity is triggered as the proposed dam would require approval in terms of a new Water Use (Section 21g) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **National Water Act, 1998:** Section 21(g) water use
Roads	0.6ha	1km in length 6m in width	24°54'56.66"S 30° 6'26.28"E	**Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan.
Pipeline	0.3ha	1.5km in length	24°55'33.74"S 30° 6'52.77"E	**Listing Notice 1, Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.
Topsoil Stockpile	1ha	No higher than 5m.	On existing Topsoil Stockpile of the North TSF.	**Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan.
TSF Option C				

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
TSF	28ha	Height: 29m	24°56'49.45"S 30° 6'51.53"E	**Listing Notice 1, Activity 12**: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1: Activity 19:** 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. **Listing Notice 2, Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **Listing Notice 3, Activity 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 (if applicable). **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **Regulation 921, as amended by Regulation 633 dated 24 July 2015: Waste Management Activity, Category B, Activity 11**: 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). **National Water Act, 1998:** Section 21(g) water use
RWD	2ha (clearance included as part of the overall TSF activity)	To be determined.		**Listing Notice 1, Activity 12:** The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1, Activity 13**: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more (depending on the RWD requirements). **Listing Notice 1, Activity 19** (specific should Option D be chosen, and also depending on the alluvial aquifer potentially associated with Option B)**:** 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. **Listing Notice 2, Activity 6**: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. – this activity is triggered as the

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
				proposed dam would require approval in terms of a new Water Use (Section 21g) in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) and 21(g) water uses
Roads	1ha	2km in length 6m in width	Approximate locations 24°55'45.99"S 30° 7'8.56"E 24°56'43.54"S 30° 7'3.18"E	**Listing Notice 1, Activity 12**: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse **Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) water uses
Pipeline	0.2ha	2km in length		**Listing Notice 1, Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. **Listing Notice 1, Activity 12** - The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse **Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
				such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) water uses
Topsoil Stockpile	1ha	No higher than 5m.	To be determined (but next to TSF)	**Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan.
TSF Option D				
TSF	21ha	Height: 49m	24°54'59.73"S 30° 7'30.58"E	**Listing Notice 1, Activity 12**: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1: Activity 19:** 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. **Listing Notice 2, Activity 15**: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— the undertaking of a linear activity. **Listing 3, Activity 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 (if applicable). **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **Regulation 921, as amended by Regulation 633 dated 24 July 2015: Waste Management Activity, Category B, Activity 11**: 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). **National Water Act, 1998:** Section 21(g) water use
RWD	2ha (clearance included as part of the overall TSF activity)	To be determined.		**Listing Notice 1, Activity 12:** The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
				Listing Notice 1, Activity 13: The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more (depending on the Return Water Dam requirements). **Listing Notice 1: Activity 19** (specific should Option D be selected)**:** 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. **Listing Notice 2, Activity 6**: The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent. – this activity is triggered as the proposed dam would require approval in terms of a new Water Use (Section 21(g)) in terms of the NWA. **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) and 21(g) water uses
Roads	1.5ha	1.5km in length 6m in width	Approximate coordinates: 24°55'14.62"S 30° 7'31.30"E 24°55'45.99"S 30° 7'8.56"E	**Listing Notice 1, Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. **Listing Notice 1, Activity 12:** The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse **Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c&i) water use
Pipeline	0.3ha	1.5km in length		**Listing Notice 1, Activity 10**: The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
				internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more. **Listing Notice 1: Activity 12**: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse **Listing Notice 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) water use
Topsoil Stockpile	1ha	No higher than 5m.	On existing Topsoil Stockpile of the North TSF.	**Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

1.d.ii.1.a TSF Operational Considerations

The final TSF will likely follow a dry deposition technology, unlike the conventual disposal method of the existing North TSF. The selected TSF will therefore be:

- A lined facility;
- A lined Return Water Dam (RWD);
- Associated infrastructure (pipelines, and roads); and
- The tailings deposition method will be either a dry deposition, spigot, cyclone or day wall. The current preferred option will involve the piping of tailings to a filter press facility from where the filter cake will be trucked to the new TSF.

The following table presents the typical considerations in the operational setting of the proposed facility.

Table 10: Operational Setting for each site alternative

Discussion	Site B	Site C	Site D
Height of TSF (m)	37	29	49
Area (ha)	20	28	21
Clean water diversions	5 000m^3 excavation 1 000m concrete lining	20 000m^3 excavation 1 900m concrete lining	45 000m^3 excavation 1 400m concrete lining
Return Water Dam (RWD)	58 000m^3; liner of 17 000m^2	63 500m^3, liner of 17 500m^2	65 500m^3, liner of 17 000m^2
Return water pipeline & pumping	1 300m length, 18m static head	760m length, -5.5 m static head [stream crossing]	1 753m length, -26 m static head
Deposition rate (t/month)	34 172		
Methodology	Tailings piping to Filter Press and from there the dry material will be deposited onto the new facility. Return water pipeline will be in place from Filter press to the Plant or to the proposed RWD.		
Final Side Slope	1:3		
Duration to required capacity	300 months (25 years)		
Liner	Class C liner – Type 3 Waste		
Slurry and return water pumping distance (m)	1 300	2 760	1 753

1.d.ii.1.b Location

1.d.ii.1.b.1 Site B (TSF Option B)

Site B is located northwest of the Beneficiation Plant and the existing Waste Rock Dump. This Site is located to the north of the proposed expansion of the Discard Dump. The earmarked expansion of the Discard Dump, has received an Environmental Authorisation on 15 February 2018 from the DMRE. Please see the location of the Discard Dump expansion in relation with Site B.

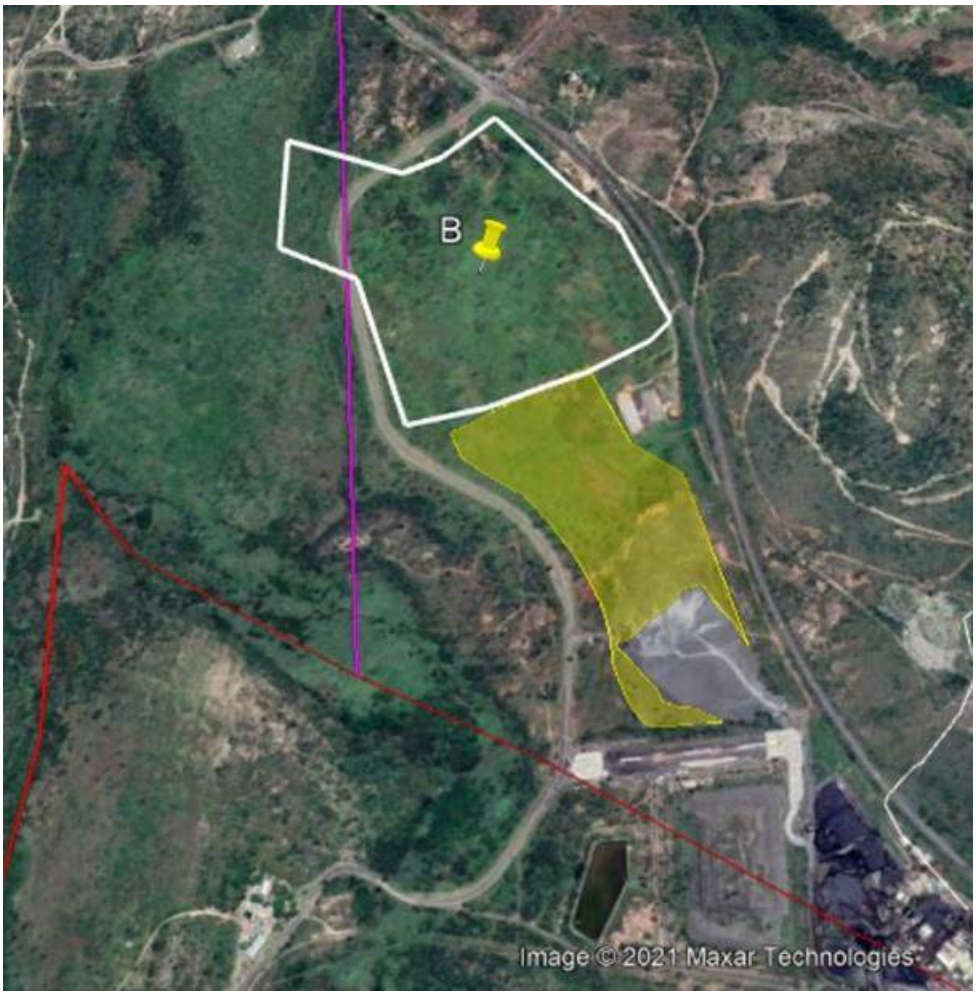


Figure 4: Site B in relation with the Discard Dump Expansion (in yellow)

The following photograph indicates the view of the proposed site, taken from the southern side of Site B (from the top of the existing Discard Dump).

Figure 5: Site B

Site B is preferred due to its proximity to the Beneficiation Plant and other services located around 1.3km to the south of Site B. The footprint of this site is planned at about 20ha.

1.d.ii.1.b.2 Site C (TSF Option C)

Site C is located west of the Groot Dwarsrivier, about 1.6km south of the Beneficiation Plant. A non-perennial drainage channel, which is an unnamed tributary of the Groot Dwarsrivier, traverses this site alternative.

The following photograph indicates the view of the northern section of the proposed site, taken from the eastern side of Site C.

Figure 6: Site C

The footprint of this site is planned at about 28ha, the largest in extent of the three (3) options.

1.d.ii.1.b.3 Site D (TSF Option D)

Site D is located to the north of the existing North TSF, about 1.4km from the Beneficiation Plant. The footprint of this site is planned at about 21ha.

A non-perennial drainage channel, which is an unnamed tributary of the Dwarsrivier traverses this site. The following photograph indicates the view to the proposed site in a northerly direction. The photograph was taken from the access road.

Figure 7: Site D

1.d.ii.2 Project 2: Diesel and Emulsion Batching

The mine currently has an approved allocation for the storage of 386m^3 of dangerous goods (diesels and other hydrocarbons). Storage is currently approved in the following areas:

- Farm Dwarsrivier 372KT RE: North Shaft Fuel and Oil Storage.
- Farm Dwarsrivier 372KT RE: North Shaft Underground Fuel Supply.
- Farm Dwarsrivier 372KT Portion 1: South Mine Bulk Fuel and Oil Storage.
- Farm Dwarsrivier 372KT Portion 1: South Mine Main Stores Fuel and Oil Storage.

- Farm Dwarsrivier 372KT Portion 1: Plant Workshop.

As the underground mining progresses in line with the approved Mining Works Programme, it is required that the surface infrastructure be adapted to suit the development of the mining operations. The surface developments are undertaken to provide efficient and safe operation from a life safety, environmental safety and cost effective operation perspective. Given the current area of operation at South Shaft and considering the following five (5) year mining plan, the need to consider additional off-loading and bulk Storage of Emulsion and Diesel closer to the immediate work area to a surface position over current strikes at the South Shaft decline have arose. The mine therefore identified the need to erect two (2) batching areas, for diesel and emulsion batching, respectively, to supply diesel and emulsion to the underground mining operations. The location of the diesel and emulsion batching areas are to the north-east of the old Two Rivers Platinum Mine (TRP) Tailings Storage Facility, with the Diesel Batching area just south of the new TRP Tailings Pipeline and the Emulsion Batching area just north of the pipeline. The project will include:

- Diesel Batching Area:
  - Construction of an access road, approximately 55m in length and 6m in width, to the Diesel Batching area;
  - Due to the imposed limitations of the Mines Health and Safety Act, 29 of 1996 that limits the storage of hydrocarbons to 3 (Three) days of operation, the majority of the diesel, hydraulic oil and lube oil required will be stored at surface in a purpose designed and constructed terminal that provides the necessary life safety and environmental safety required. The project will involve the storage of two (2) horizontal, aboveground diesel tanks of 33m^3 each (as well as a possible future 22m^3 tank), a 40m^3 API self-bunded tank (Isotainer) for Hydraulic Oil and a 20m^3 API self-bunded tank for Lube Oil. A total combined storage of 148m^3.
  - The product description is:
    - Diesel - Fuel component for compression ignition powered automotive applications with UN number 1202 and CAS-No 68334-30-5. It is combustible and releases very low volumes of vapours.
    - Hydraulic Fluid – as a lubricant or additive and also for use in hydraulic systems with CAS-No. 64742-54-7
    - Lube Oil – is a hydrocarbon used for purposes of lubrication of moving parts with CAS-No. 68784-26-9
- Emulsion Batching Area:
  - Construction of an access road, approximately 80m in length and 6m in width, to the Emulsion Batching area;
  - No emulsion will be stored at the surface location and all product decanted will be stored underground at a purpose built depot located at Strike N15G / N17A. The surface location will be used for the express purpose of transferring emulsion from a designated road tanker, via the off-loading pipeline to the underground storage tanks.
  - The product is an Ammonium Nitrate emulsion intermediate fluid that is used for preparing blasting explosives. The trade name is DDSTM Emulsion provided by SASOL / Enaex with UN number 3375 and an average specific gravity of 1.35. It is an oxidant classified as class 5.1 and is stored away from combustible materials.
  - The mine intends storing a total of 60 (Sixty) tons (similarly 60m^3) of Emulsion product underground, with no surface storage being done and, no pipeline inventory.
- General:
  - Parking and offloading Area, with security offices at both areas (no dangerous good storage is planned to take place at any time);
  - Other internal roads will be required to access the various pipelines, these are however included into the overall clearance consideration of the project, and not as stand-alone roads.
  - The batching areas (diesel and emulsion) will feed into pipelines for underground use at both areas.

Clearance of indigenous vegetation will be required in the order of approximately 3ha (including Diesel and Emulsion Batching and the access road).

Figure 8: Diesel and Emulsion Batching Areas

Please refer to the following table for details regarding this project:

Table 11: Project 2: Diesel and Emulsion Batching

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
Dispatching of diesel and emulsion to the underground via pipelines	5ha	• 80m and 50m access roads of about 6m in width. • Diesel Batching: aboveground diesel tanks of 33m³ each (as well as a possible 22m³ tank), a 40m³ API self-bunded tank (Isotainer) for Hydraulic Oil and a 20m³ API self-bunded tank for Lube Oil. A total combined storage of 148m³. • Emulsion 60 tons (similarly	Diesel Batching: 24°56'54.50"S 30° 6'28.96"E Emulsion Bathing: 24°56'44.16"S 30° 6'33.50"E	Listing Notice 1, Activity 14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. (combined capacity of both facilities). Listing Notice 1: Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation (combined clearance). Listing Notice 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. Listing Notice 3, Activity 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 (diesel storage area). Listing Notice 3, Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan (diesel storage area).

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
		60m³) of Emulsion product underground, with no surface storage being done and, no pipeline inventory. • Feed into pipeline for underground use at both areas. Clearance of indigenous vegetation will be required in the order of approximately 5ha.		

1.d.ii.3 Project 3: Main Parking Extension

The mine requires the expansion of the existing parking area at the Main Offices. The current parking area is about 0.8ha with the parking bays not sufficient to cater for the number of vehicles. The current parking bay comprises of a paved surface area and steel roof parking bays. The same principle will be applied at the expanded area. No new entrances will be required. The planned parking bay expansion will be located about 20m from the Springkaanspruit.

Clearance of indigenous vegetation will be required in the order of approximately 0.5ha.

Figure 9: Parking Bay Extension

Please refer to the following table for details regarding this project:

Table 12: Project 3: Parking Bay Extension

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
Extension of existing Main Parking Area by 4 900m² within close proximately 20m of the Springkaanspruit. No additional specific roads will be required, traffic will be managed within the overall parking bay layout.	0.5ha	The planned parking bay expansion will be located about 20m from the Springkaanspruit. Clearance of indigenous vegetation will be required in the order of approximately 0.5ha.	24°56'2.34"S 30° 7'22.70"E	**Listing Notice 1, Activity 12**: The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. **Listing Notice 1: Activity 48:** The expansion of infrastructure or structures where the physical footprint is expanded by more than 100m² or more, where such expansion occurs within a watercourse or within 32m of a watercourse. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan (diesel storage area). **Listing Notice 3, Activity 14**: The development of— (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. **National Water Act, 1998:** Section 21(c) & (i) water use

1.d.ii.4 Project 4: Widening of Access Road between South Shaft/Main Offices and Plant

An existing road provides access between the Main Office Buildings and the Plant. This road crosses the non-perennial Springkaanspruit. The crossing is approved in terms of the 2011 WUL issued by the DWS to the mine. No changes to the river crossing will be required as part of this project.

The current width of the road ranges between 5m and 6m. The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic. The purpose is to improve the safe operation of traffic on this road.

Clearance of indigenous vegetation will be required in the order of approximately 0.3ha.

Figure 10: Widening of Access Road

Please refer to the following table for details regarding this project:

Table 13: Widening of existing road

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
An existing road provides access between the Main Office Buildings and the Plant. The current width of the road ranges between 5m and 6m. The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic. Clearance of indigenous vegetation will be required in the order of approximately 3 311m^2.	0.3ha	The mine is planning on increasing a section of 700m of this road to a width of 16m to allow for two-way traffic.	Start 24°55'51.77"S 30° 6'58.99"E End 24°55'59.12"S 30° 7'17.29"E	**Listing Notice 1: Activity 48:** The expansion of infrastructure or structures where the physical footprint is expanded by more than 100m^2 or more, where such expansion occurs within a watercourse or within 32m of a watercourse. (This is a potential activity, as the expansion will take place after the current road crossing over the Springkaanspruit.) **Listing Notice 3, Activity 18:** The widening of road by more than 4m, or the lengthening of a road by more than 1km. **Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

1.d.ii.5 Project 5: Access Crossing between Plant and North Mine (Subway Crossing)

Please refer to the following table for details regarding this project:

Table 14: Project 5: Access Crossing between Plant and North Mine

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
To ensure more optimal logistical management of traffic between the South Mine and the North Mine, and to reduce the number of vehicles on the regional road, the mine is planning on constructing a road under regional road bridge to allow for access between the two areas. Clearance of indigenous vegetation will be required in the order of approximately 0.2ha.	0.2ha	Length of about 120m underneath existing regional road. Width not to exceed 12m.	24°55'56.30"S 30° 7'22.34"E	**Listing Notice 3, Activity 12**: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a Maintenance management plan. **Listing Notice 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **National Water Act, 1998:** Section 21(c) & (i) water use

1.d.iii Description of the Activities to be undertaken

The infrastructure and activities that will form part of the proposed project will include the following:

- Planning Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits and Authorisations)
- Construction Phase:
  - Demarcation and identification of protected species
  - Land and footprint clearance
  - Topsoil stripping and stockpiling
  - Establishment of surface infrastructure
  - Waste management
- Operational Phase:
  - Operation of TSF and associated RWD
  - Operation of road and parking infrastructure
  - Operation and use of Diesel and Emulsion Storage and Supply
  - Transportation (roads)
  - Operation of infrastructure and roads
  - Water management
  - Dust suppression
  - Waste management
- Closure Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits)
  - Rehabilitation of TSF and associated RWD

- Dismantling of pipelines and associated soil remediation where required
- Dismantling and decommissioning of infrastructure and buildings, including product stockpiles
- Earth moving, shaping and ripping of soils
- Cessation of Labour Contracts
- Waste Management

1.e Policy and Legislative Context

South Africa has a comprehensive environmental governance framework underpinned by an extensive array of environmental laws. The past years have evidenced the wholesale reform of South Africa's environmental legal framework under the guidance of the Constitution.

Historically, the mining industry in South Africa has not been subjected to comprehensive environmental regulation. However, in recent years, this has changed significantly and the industry is now required to comply with a multifaceted network of mining and environmental legislation. There are no shortages of policy and legal frameworks to ensure "responsible" mining in South Africa. The Minerals and Mining Policy for South Africa, 1998 affirmed that the State, as custodian of the nation's natural resources, will support mining development while maintaining and enhancing environmental awareness of the mining industry in accordance with national environmental policy, norms and standards.

The following table presents the key policy and legislative considerations as part of this application.

Table 15: Policy and Legislative Context

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
The Constitution of South Africa (Act No. 108 of 1996)	Sustainable development is relevant to all projects.	The Constitution reigns supreme and the advancement of human rights is one of the foundations of South Africa's democracy. Furthermore, the Bill of Rights plays a central role in the democratic regime because it embodies a set of fundamental values which should be promoted at all times. An environmental right is contained in Section 24 and is, arguably, the cornerstone for environmental governance in South Africa, which includes the mining industry. Section 24(a) proclaims the right of everyone "to an environment that is not harmful to their health or well-being". Mining companies are thus duty-bound to constitutional, legislative, and other measures to prevent pollution and ecological degradation, promote conservation and to develop in a sustainable manner. The Constitution cannot manage environmental resources as a stand-alone piece of legislation, hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations is designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Legislation		
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	This Draft Scoping Report & the EMPr which will follow as part of the EIA process.	In respect of the Listed Activities in terms NEMA, Section 24F(1)(a) of NEMA stipulates the following: ***"no person may- commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the competent authority or the Minister of Minerals and Energy, as the case may be, has granted an environmental authorisation for the activity…"*** Section 24F is clear in its prohibition that only those "***listed or specified***" activities may not commence without prior Environmental Authorisation. Consequently, the activities to be conducted by the Mine will only trigger Environmental Authorisation requirements when these said activities trigger a listed or specified activity referred to in Section 24F. Furthermore, note that the law is clear in that NEMA and its Regulations ***do not have retrospective working***. Accordingly, in terms of the various Listing Notices promulgated since 1997, it is paramount to link the commencement date of the specific activities with the corresponding Listed Activities. There are currently five sets of EIA Regulations which govern potential Listed Activities. The focus should be on if ***and when*** a Listed Activity was commenced with in terms of the specific Regulations; i.e.: - Environmental Conservation Act, 1989 (ECA) Listed Activities, promulgated in terms of the ECA (effective between 08 September 1997 and end of day 09 May 2002); - ECA Listed Activities, promulgated in terms of the ECA (effective between 10 May 2002 and before end of day 02 July 2006); - The 2006 EIA Regulations, 2006 Listing Notice 1 and 2006 Listing Notice 2 (effective between 03 July 2006 and end of day 01 August 2010); - The 2010 EIA Regulations, 2010 Listing Notice 1, 2010 Listing Notice 2 and 2010 Listing Notice 3 (effective between 02 August 2010 and end of day 07 December 2014.); and - The 2014 EIA Regulations, 2014 Listing Notice 1, 2014 Listing Notice 2 and 2014 Listing Notice 3 (commencement date 08 December 2014, as amended in April 2017). Accordingly, an activity must be assessed in terms of the specific Regulations applicable at the time of commencement of the specific activity.

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
		EnviroGistics undertook a detailed review of the listed activities according to the proposed project description to assess the listed activities that are considered applicable. The assessment was undertaken in line with the 2017 EIA Listed Activities. An integrated Environmental Authorisation in terms of the NEMA and NEMWA is required. The EIA Application fee of R15 000 was paid to the DMRE on 8 July 2021. An Application for Environmental Authorisation was couriered to the DMRE on 12 July 2021. The DMRE acknowledged the application on (*still awaiting acceptance, date to be updated in the final ESR*). (Refer to Annexure 1). *Under the One Environmental System (December 201), the Minister of Mineral Resources will issue environmental authorisations in terms of the NEMA for mining activities related to the primary extraction and/or primary processing of ore material. The Minister of Environmental Affairs will form the appeal authority.*
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 1998) (MPRDA)	Existing Mining Right, amendments to activities and addition to infrastructure and activities on site.	Since 2004, the MPRDA has been the principal piece of legislation that regulates the South African mineral and petroleum sector. The MPRDA was enacted with the objectives of promoting local and rural development, ensuring equal access to minerals, and eradicating discriminatory practices in the industry, while still guaranteeing security of tenure to participants in the industry and increasing the industry's international competitiveness. Recent amendments to NEMA and the MPRDA have been published with the objective to align NEMA and the MPRDA authorisation processes as well as to provide for cooperative governance between the DMRE and the Department of Environmental Affairs (DEA) (now the Department of Forestry, Fisheries and Environment (DFFE)). The governing provisions in respect of EMPr's were removed from the MPRDA and incorporated into Sections 24N, 24O, 24P, 24Q, 24R and 24S of NEMA. The project does not entail any additional authorisation for mining rights in terms of the MPRDA. The surface infrastructure will be located within the approved mining area within Dwarsrivier Chrome Mine. No changes to the Mining Works Programme are required at this time, as Project 1 of this application will present information feeding into the need to potentially amend the Mining Works Programme.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)	The NEMWA waste activities are not being triggered as part of this project. However, this legislation is considered in the development of waste management measures and	The NEMWA fundamentally reformed the law regulating waste management, and for the first time provides a coherent and integrated legislative framework addressing all the steps in the waste management hierarchy. The objectives of the NEMWA are to protect health, well-being and the environment by providing reasonable measures for, *inter alia*, remediating land where contamination presents, or may present, a significant risk of harm to health or the environment. The objectives of the NEMWA are structured around the steps in the waste management hierarchy, which is the overall approach that informs waste management in South Africa. The waste management hierarchy consists of options for waste management during the lifecycle of waste, arranged in descending order of priority; i.e.: waste avoidance, reduction, re-use, recycling, recovery, treatment, and safe disposal as a last resort. NEMA, as previously mentioned, introduced a number of additional guiding principles into South African environmental legislation, including the life-cycle approach to waste management, producer responsibility, the precautionary principle and the polluter pays principle (i.e. the sustainability principles as contained in Section 2 of NEMA). Section 5(2) of the NEMWA stipulates that the Act should be interpreted and guided in accordance with these sustainability principles.

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
	assessing potential impacts.	The NEMWA, furthermore, echoes the duty of care provision in terms of Section 28 of NEMA, by obliging holders of waste to take reasonable measures to implement the waste management hierarchy. Section 16(1) of the NEM:WA provides that: *"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 this Act; and* *f) prevent the waste from being used for an unauthorised purpose."* When considering whether a "substance" is considered a "waste" or not, the definition of the NEM:WA must be considered. The NEM:WA defines "waste" as: *"Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of this Act; or* *Any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette."* This project will involve an Integrated Environmental Authorisations to apply for approval from both the NEMA and NEMWA.
The Hazardous Substances Act, 1973 (Act No. 15 of 1973) (HSA)	Management of Chemicals	All chemicals transported to and stored on site will be handled in accordance with the HSA and the applicable materials safety data sheets. A chemical log will be kept and all the necessary signage erected on site.
National Heritage Resources Act, 1999 (Act No. 25 of 1999 (NHRA)	Potential presence of heritage sites during construction and excavation activities.	Section 34 and 38 of the NHRA details specific activities that require an approved Heritage Impact Assessment by SAHRA. *A heritage permit will be required as a new road exceeding 300m in length will be constructed. In addition, more than 5 000m^2 of land will be cleared for the new mining operations, including the re-use of historic mines.* A heritage assessment and paleontological will be undertaken to comply with Regulation 38 of the NHRA. The SAHRA forms part of the Interested and Affected Parties (I&APs), and the draft Scoping Report will be made available for comment.
National Water Act, 1998 (Act No. 36 of 1998) (NWA)	Establishment of facilities containing waste or water containing waste.	One of the main and ever-continuing concerns in South Africa is the sustainability of water management, and the costs associated with the prevention and remediation of pollution. The NWA is one of the government's answers to some of these challenges and functions as sectoral legislation within the framework of NEMA. Section 19 of the NWA echoes the duty of care envisaged in Section 28 of NEMA and addresses the prevention and remediation of the effects of pollution. The NWA provides for a broad duty of care in that: *"(1) an owner of land, a person in control of land or a person who occupies or uses the land on which-*

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
		a) any activity or process is or was performed or undertaken; or *b) Any other situation exists, which causes, has caused or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring."* The words "likely to cause pollution" broadens the scope of the duty, which enables an activity, or situation that is land-based, to trigger the application of the duty. The "reasonable measures" are not prescribed, but may include measures intended to: *"Cease, modify or control any act or process causing the pollution; comply with any prescribed waste standard or management practice; contain or prevent the movement of pollutants; eliminate any source of pollution; remedy the effects of pollution; and remedy the effects of any disturbance to the bed and banks of a watercourse."* The NWA, furthermore, provides for water use authorisations which a mine will have to apply for, before commencing with its primary activity of mining. Water uses that need to be licensed under Section 21 of the NWA include: a) Taking water from a water resource; b) Storing water; c) Impeding or diverting the flow of water in a watercourse; d) Engaging in a stream flow reduction activity; e) Engaging in a controlled activity; f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; g) Disposing of waste in a manner which may detrimentally impact on a water resource; h) Disposing in any manner of waste which contains waste from, or which has been heated in , any industrial or power generation process; i) Altering the bed, banks, course or characteristics of a watercourse; j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and k) Using water for recreational purposes. A new WUL process will be undertaken for the proposed activities. This project will involve the requirement for Section 21(c) & (i) and Section 21(g) water uses. It is unlikely that dam safety requirements will be triggered for the RWD, this will however be confirmed as part of the TSF design process which is currently underway.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)	Relevant to protected tree removals, as well as to development within the CBA and threatened ecosystem areas.	The NEMBA addresses a number of issues related to biodiversity and how it should be protected and managed in undertaking development activities. The purpose of the NEM:BA is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed. The operation has an approved permit to authorise actions and activities affecting Protected Trees (Ref: LP-SDM-2017-06-06-B). The Permit is valid up until 26 June 2018. For this project an ecological assessment will be undertaken to determine the sensitivity of the ecological setting. The necessary tree/ plant removal permits will be applied for. The DFFE is included as an IAP and will also receive and opportunity to comment on the Scoping Report.

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
		According to the Fetakgomo Tubatse Municipality Integrated Development Plan (IDP) 2016-2021, the largest proportion of land in the area (probably in excess of 80%) is natural environment. The mines, agriculture and urban development have barely encroached on these wilderness areas. The wilderness generally comprises of bushveld and sparse grassland in limited parts of the municipality. It is important to preserve the wilderness for posterity and harvest plant and animal species in a manner that preserve this habitat. For this reason, the IDP states that an investigation on the occurrence of Red Data Listed (RDL) species in the area should be undertaken to identify any hotspots for conservation, as information on this aspect is lacking for the local municipality.
Municipal Plans		
Integrated Development Plan (IDP) (Final IDP/Budget 2020/2021 Consolidated IDP for Fetakgomo Greater Tubatse Municipality	Economic Development IDP Vision 2030: "A developed platinum city for the benefit of all"	The IDP states that in the medium to long term it is intended to create a more prosperous Fetakgomo Tubatse Local Municipality through provision of services, social cohesion and nation building, local economy and job creation, help to adapt to the changing climatic conditions, integrated communities, public participation and accountability, education, health, fighting against fraud and corruption. The IDP lists a number of statements, which includes: • Develop and Strengthen Local Economies for Job Creation • Improving Health in Rural Communities • Education • Building Spatially Integrated Communities • Improving Public Participation and Accountability The Municipal Mission Statements are: • Accountable through active community participation • Economic enhancement to fight poverty and unemployment • Render accessible, sustainable and affordable service • Municipal transformation and institutional development • Sustainable livelihoods through environmental management The IDP states that amongst others, opportunities offered by the local municipality include: (a) mining investment opportunity; (b) land availability opportunity; (c) tourism opportunity; (d) funding source opportunity from private sector; and (e) job creation opportunity from infrastructure investment. The IDP states clearly that with the exception of the creativity of people, mining still presents the largest opportunity in the area to a sustainable economic base whereby the local economy and the area is growing at a higher pace. Mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. The municipality will be able to develop sector plans, policies and by-laws which will be utilised for the planning of the area and regulate both the internal and external affairs.
Land Claims	According to the IDP	The following land claims exist on Dwarsrivier 372KT: • Mashigwana MM (12/09/1998) – under research • Makwana MD (12/09/1998) – under research • Tshehla TL (12/15/1998) – under research • Mashigwana KJ (12/09/1998) – under research

Applicable Legislation And Guidelines Used To Compile The Report	Reference Where Applied	How Does This Development Comply With And Respond To The Legislation And Policy Context
		• Baleshaba community (3/03/1998) – Gazetted/ Further Research
National Development Plan (NDP)	Local Municipality within the National and Provincial Planning Context	The IDP/ Budget proposes to argue that South Africa displays what could be seen or described as a "top-down, and, at the same time, bottom-up" process of development planning. The NDP is a plan for the country to encourage long term planning i.e. up to 2030. The municipality incorporates the long term visioning as espoused in the NDP. The following six pillars have widespread merits for strategic planning: • Unite all South Africans around a common programme to fight poverty and inequality and promote social cohesion; • Have South Africans be active citizens in their community and in the development of the country; • A growing and inclusive economy with higher investment, better skills, rising savings and greater levels of competitiveness; • Building capabilities of the people and the state; • A developmental state capable of correcting historical inequalities and creating opportunities for more people while being professional, competent and responsive to the needs of all citizens; and • South African leaders putting aside narrow sectarian interests in favour of national interest and putting the country first.
Limpopo Development Plan (LDP) 2015 - 2019	Support to the IDP	The strategy outline of the IDP draws linkages with reference to the Limpopo development objectives. As a corollary, the LDP (2015-2019) identifies the municipality under the platinum cluster due to its considerable potential and competitive advantage for economic cluster development. The municipality is also identified as a provincial growth point. Specifically, this municipality and Musina Local Municipality were identified as Special Economic Zones. The entire planning outline of the IDP/ Budget is designed on the floor plan of the provincial and national contexts.

1.f Need and Desirability of the Proposed Activities

Currently Dwarsrivier Mine is serviced by approximately 1200 permanent and 800 contractor employees. The majority of the employees are locals drawn from Lydenburg and villages around the mine, including Steelpoort Park, Kalkfontein and Buffelshoek.

As discussed in the previous section, and with specific reference to the Fetakgomo-Greater Tubatse Local Municipality IDP, mining is regarded as an opportunity offered by the municipality, with the IDP stating that the mining activities and natural resources available in the area have created a definite potential to develop tourism and thereby to diversify the economic base of the municipality. When one further considers the importance of chrome in the global market it should be noted that according to an article by S&P Global Plats, 6 March 2017 (https://www.platts.com/latest-news/metals/tokyo/strong-chrome-demand-to-hold-but-views-divided-26678512), "strong demand for chromite feedstock of ferrochrome will continue to hold on the back of robust Chinese stainless steel output, but views are divided on whether global supply will move into deficit due to constraints of South African production to meet that demand, industry sources told S&P Global Platts Monday". According to the article, "sources said there are two possible scenarios arising from South Africa trying to meet Chinese demand amid stagnated output: the market will be short on chrome ore supply as other global suppliers will not be able to fully meet China's demand, or China will reduce dependency on South African chromite supply and diversify to other resources." According to the Mining Weekly Online (http://m.miningweekly.com/article/strong-outlook-for-recovering-ferrochrome-industry-merafe-2017-03-08/rep_id:3861): "The Chinese economy, on which the ferrochrome and chrome ore markets are heavily dependent, grew by 6.7% year-on-year, underpinning pleasing growth in stainless steel production. Ferrochrome-using stainless steel production is projected to grow by 3.5% in 2017 and by 3.8% in 2018, which should be followed by increased ferrochrome demand."

In consideration of the above, the overall aim of the proposed activities is to improve the logistics on site, ensure a suitable supply of chrome for markets, as well as to ensure a detailed and provable understanding of the mineral resources.

1.f.i Project 1: Khulu TSF

In consideration of the above, the overall aim of the proposed activities is to ensure that a well-designed tailings disposal system is operated on site to allow for the production requirements on site. The existing North TSF was designed to contain production tonnages for 23 years, with 29 000 tonnes for the first two (2) years of operation and the remaining twenty one (21) years at a deposition rate of 17 280 tonnes per month. It is anticipated that the existing North TSF will reach its full capacity within the next three (3) to five (5) years and therefore the need has arose for a new TSF facility.

The mine is further planning on changing the TSF technology of deposition to a filter press system. The filter press methods involve equipment used in liquid/solid separation. The filter press separates liquids and solids utilising pressure filtration. A slurry/slimes is pumped into the filter press and is dewatered under pressure. The filter cake will be deposited via trucks or a conveyor system onto the TSF, and water will be recirculated to the Plant or proposed RWD. The filter press will be designed based on the volume and type of slurry that needs to be dewatered.

This is currently considered the preferred technology, due to the reduction in water to be stored on the proposed TSF, and also the opportunity to recycle water through the plant.

1.f.ii Project 2: Diesel and Emulsion Batching

The placement of the diesel and emulsion batching area is developed in line with the underground mining operations. The placement will ensure the opportunity to directly pipe diesel and emulsion to the underground workings without excessive surface pipeline systems, which could lead to spills.

1.f.iii Project 3: Main Parking Extension

This project is purely for logistical purposes. The current parking area is about 0.8ha with the parking bays not sufficient to cater for the number of vehicles. The current parking bay comprises of a paved surface area and

steel roof parking bays. The same principle will be applied at the expanded area. No new entrances will be required.

1.f.iv Project 4: Widening of Access Road between South Shaft/Main Offices and Plant

This project is purely for safety and logistical purposes. The purpose is to improve the safe operation of traffic on this road.

1.f.v Project 5: Access Crossing between Plant and North Mine

This project is purely for logistical purposes. To ensure more optimal logistical management of traffic between the South Mine and the North Mine, and to reduce the number of vehicles on the regional road, the mine is planning on construction a road under regional road bridge to allow for access between the two areas.

1.g Period for which the Environmental Authorisation is required

The Environmental Authorisation is required for the life of mine, which is in excess of 25 years.

1.h Description of the process followed to identify Alternatives for the Overall Preferred Site, Activities and Technology Alternative

The site selection process involved an engineering component as well as a biophysical and socio-economic component.

The mine initially identified seven (7) potential sites for construction of the Khulu TSF, which have since been reduced to three (3) site alternatives (Sites B, C, and D), with Site B being the most favourable for the mine based on the engineering studies.

The engineering component was undertaken by an independent company appointed by the mine, whilst the bio-physical and socio-economic components were addressed as part of the specialist studies undertaken for the EIA process and this site selection option analysis, which will feed into the EIA process.

A standing engineering design principle is that the site conditions, as well as the physical and chemical properties of the tailings will define the basic design requirements of the TSF.

The most significant considerations in terms of site conditions are:

- The impact on the health and safety of people and the environment as per the Mine Health and Safety Act (Act No 29 of 1996), standards stipulated in SANS 10286, NEMA and related regulations and standards.
- The potential site topography defines whether a valley TSF, a side slope TSF, an impoundment TSF or a combination of the aforementioned development methods can be developed successfully. With exception of Site B, the remainder of the site alternatives considered are located on rock outcrops, within mountainous hills or valleys and potential river crossings or diversions.
- Type of tailings to be deposited. This relates to particle size distribution in terms of fine grained or coarse grained particles, as well as the clay mineralogy and salt content. This relates to the mine waste material's potential to pollute the environment. It is anticipated that the geochemical classification of the material will require a barrier lining system as prescribed in the NEMA regulations, similar to the liner system used at existing TSFs.
- High seismic activity. This is not applicable to the Dwarsrivier Mine area, with the exception of imposed seismicity due to mining activities.
- Cold weather conditions where freezing and permafrost are adverse conditions. This does not apply to the Dwarsrivier Mine area.
- Poor (low strength) foundation materials.
- High rainfall intensity. This is not the case with Dwarsrivier Mine area.

The site alternatives were further assessed for preference in terms of each of the following specialist requirements:

- Soils, Land Use and Land Capability;
- Terrestrial Ecology;

- Hydrology/ Surface Water;
- Hydrogeology and Groundwater conditions;
- Freshwater Resources (Wetlands);
- Visual Character;
- Air Quality;
- Heritage; and
- Socio-economic setting.

The assessments were based on the primary risks associated with a TSF which include the following:

Land sterilisation (including land use, ecology, palaeontology, heritage resources)

A TSF typically covers a fairly large area, sterilising the land use at least until decommissioning. Depending upon the prior land use or the soil potential of the site, the socio-environmental impact will differ. Preferably, land with low agricultural potential should be used, but watercourses should not be impacted. The impact on the fauna and flora should not compromise the sustainability of the species affected. Significant archaeological site should also be avoided.

Slurry spillages

Slurry spillages most commonly occur at valves, but could occur along the slurry pipe route, particularly as pipes deteriorate over time. The mitigation measures could include:

- Appropriate specifications of pipelines;
- Monitoring of pipe wear, pipe turning, maintenance and replacement;
- Additional containment precautions at sensitive areas along pipe route, i.e. stream crossing, bends etc.;
- Locating all valves in contained and walled areas; and
- Immediate clean up and rehabilitation in the event of spills.

Slope failures and mudflows

The prevention of slope failures and mudflows should be guarded against by the following means:

- Controlled rate of deposition so tailings gain sufficient strength to be self-supporting;
- Slopes developed at sufficiently shallow angles to ensure theoretically high factors of safety;
- Filter drains installed around the perimeter of the dam to control the phreatic surface (water) level that adversely affects slope stability;
- Operate with minimal free water on the surface to aid consolidation (density and strength gain) and maximise freeboard (stormwater holding capacity);
- Instigate routine surveillance and monitoring of the identified risk performance criteria (piezometric levels, freeboard);
- Provide off-dam containment facilities for storm water containment; and
- Operate the facility under the supervision of suitably qualified and experienced personnel.

Surface water contamination and Freshwater Habitat destruction

Surface water running off a TSF is deemed to be contaminated. A TSF should therefore be designed to comply with Government Notice 704 (GN704) in terms of the National Water Act, 1998 (NWA), which stipulates that clean and dirty water should not mix more than once in 50 years. This is achieved by:

- Siting the TSF so that extraneous clean water can be diverted away from facility;
- Constructing peripheral collection trenches, containment paddocks and dams that are sized to accommodate the 1:50 (24 hour) year design storm with an additional 800mm freeboard safety margin; and
- Making the TSF the primary water source for the Beneficiation Plant to instil motivation to effectively manage the water on and around the facility.

Ground water contamination

Unless fully lined, seepage will occur from a TSF. In most instances, the significant aspects of seepage from TSFs are the quality and quantity of that seepage and the impact that this may have on the receiving environment, i.e. the surrounding water and the underlying aquifer. The following could be implemented to mitigate the occurrence and impact of seepage:

- Exploration, investigation and analysis of the current geo-hydrological regime and predictive modelling of the potential impact arising from the TSF. Regular updating of a geo-hydrological model to provide early warning signals should significant seepage be detected;
- Instigation of monitoring systems to be able to assess and react to changing conditions;
- Installation of filter drains to capture some interstitial water prior to it seeping into the underlying soils; and
- Minimising the amount of free water held on the dam to reduce recharge.

Airborne contamination

Dust emanating from a TSF can be a significant impact, particularly if located in frequent wind areas. Measures to mitigate the impact include:

- Plant trees on the perimeter to act as windbreak; and
- Upstream development of the TSF allowing simultaneous rehabilitation as close behind the active working area where possible.

Aesthetics

A TSF imposes an intrusive new skyline into the environment. The visual impact can be improved by:

- Planting trees around the perimeter and on the TSF as it develops;
- Designing and developing the facility with more natural looking rounded corners and curved flanks rather than straight lines with sharp corners;
- Developing the facility with flatter slopes;
- Establishing vegetation simultaneously with deposition or as early as possible on the TSF side slopes;
- Sitting the facility where it has less intrusive impact; and
- The TSF site alternatives under consideration are generally located within uninhabited areas and generally on side hills of mountains, such that some of the impact will be mitigated.

Based on the outcomes of the various specialist assessments undertaken, the sites were ranked as follows:

- Preferred (1);
- Second Option (2);
- Least Preferred (3); and
- Fatal Flaw (FF).

1.h.i Details of the Development Footprint Alternatives Considered

1.h.i.1 Details of all alternatives considered

1.h.i.1.a The property on which or location where it is proposed to undertake the activity

The projects presented is located within the existing Mining Rights Area.

All the selected TSF site alternatives, with the exception of Site B, are located in hilly mountainous terrain. Due to the general classification of the tailing material in terms of NEMWA lining requirements, there is a high potential for similar requirement to be imposed on the selected TSF site and final TSF design. In terms of construction of the TSF, the potential risks include the following:

- Steep side-slopes for equipment and machinery;
- An avalanche of large boulders due to construction induced vibrations and adjacent mining activities;
- A requirement for extensive pre-work preparations including access roads, barricades, and related protection and construction-related establishment, as well as rehabilitation after completion of construction;
- The presence of water crossings; and
- Construction preparedness requirements including permits and restrictions that can potentially delay or extend the duration of construction.

1.h.i.2 Site B (TSF Option B)

Site B is the preferred site alternative due to its proximity to the plant and other services located around 1.3km south of Site B. The footprint of this site is planned at about 20ha. The footprint area is located on areas previously characterised by agricultural activities and therefore it is unlikely that any protected species would be present in this area.

The site is also located 18m below the plant in terms of elevation which provides for more effective transportation of tailings. The area in question does not require any relocation of infrastructure and will further also not require any river crossings. The constructability of the site also allows for the least cut and fill requirements from the three (3) options.

This site will require a RWD of about 58 000m^3. The Return Water Dam will be located across the public road, but will be 100m from the 1:100yr flood line.

As per the other two options, this option will include a filter press, which will be located on the existing Discard Dump footprint.

This site will provide an operating life of about 20 years.

The conditions of Site B are as follows:

- Site B is located about 1.3km to the north of the Beneficiation Plant on relatively flat topography. The site slopes towards the west, and is also readily accessible from this direction;
- The direct access for piping between Site B and the Beneficiation Plant navigates alongside an existing tarred road and electrical power line south of the Plant;
- The site is located approximately 200m from the 1:100-year flood line of a river towards the west;
- A model of the site was developed to assess the capacity of the potential TSF within the available area. This allowed a high level cost assessment of the TSF;
- Site B will require stormwater diversion infrastructure of approximately 1 000m in length at the eastern upstream flank of the potential TSF; and
- The RWD will have to be positioned downstream of the access road at the western flank of the potential TSF.

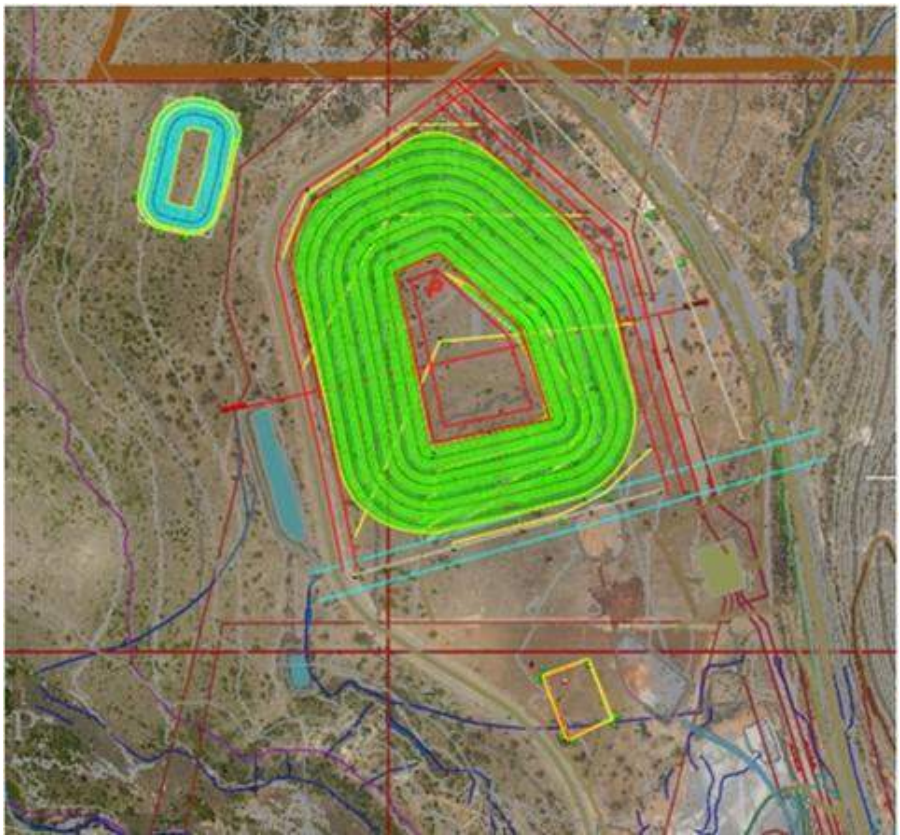


Figure 11: Site B Layout

Engineering constraints identified includes:

- Proximity of public road;
- Eskom powerline servitudes – haulage under powerline;
- Tweefontein underground mining; and
- Possible future underground mining.

1.h.i.3 Site C (TSF Option C)

Site C is located about 2.3km from the Plant and other services. The footprint of this site is planned at about 28ha, the largest in extent of the three (3) options. The area is characterised by a fairly steep topography. The vegetation comprises of grass and trees, with protected species present. Another component which is considered in this area is the presence of graves which will require potential removal permits if approved. The logistical arrangement of this site will necessitate pipeline and road crossings of the Dwarsrivier from the proposed TSF to the plant.

The site is also located 5.5m above the Plant in terms of elevation and will require the road and pipeline crossings of the Dwarsrivier. The area in question will also necessitate the relocation of low voltage powerlines.

The site is undermined, but considered stable for the purposes of the TSF design at this time.

This site will require a RWD of about 64 000m^3. The RWD will be constructed in a valley and well-designed storm water diversions will be required.

The conditions of Site C are as follows:

- Site C is located towards the south of the Beneficiation Plant. The site slopes towards the north and is readily accessible from the west;
- The site has a large surface area available for siting of a TSF;
- The site is located approximately 400m from the 1:100-year flood line of a river towards the northern side;
- The installation of slurry delivery pipelines and return water pipelines will be required across a river between the site and the Beneficiation Plant;
- In terms of the conceptual layout for the site (Figure 12), the resultant starter wall will have an expected height of approximately 7m located at the north flank, with a length of 610m;
- Stormwater diversion trenches and bunds with a combined length of approximately 1 732m will be required at the southern upstream flank; and
- Extension of Site C to the west is constricted by an existing TSF owned by another mine, towards the north and south by steep hills and mountain rock outcrops, and towards the west by a flood line of a down-gradient river.

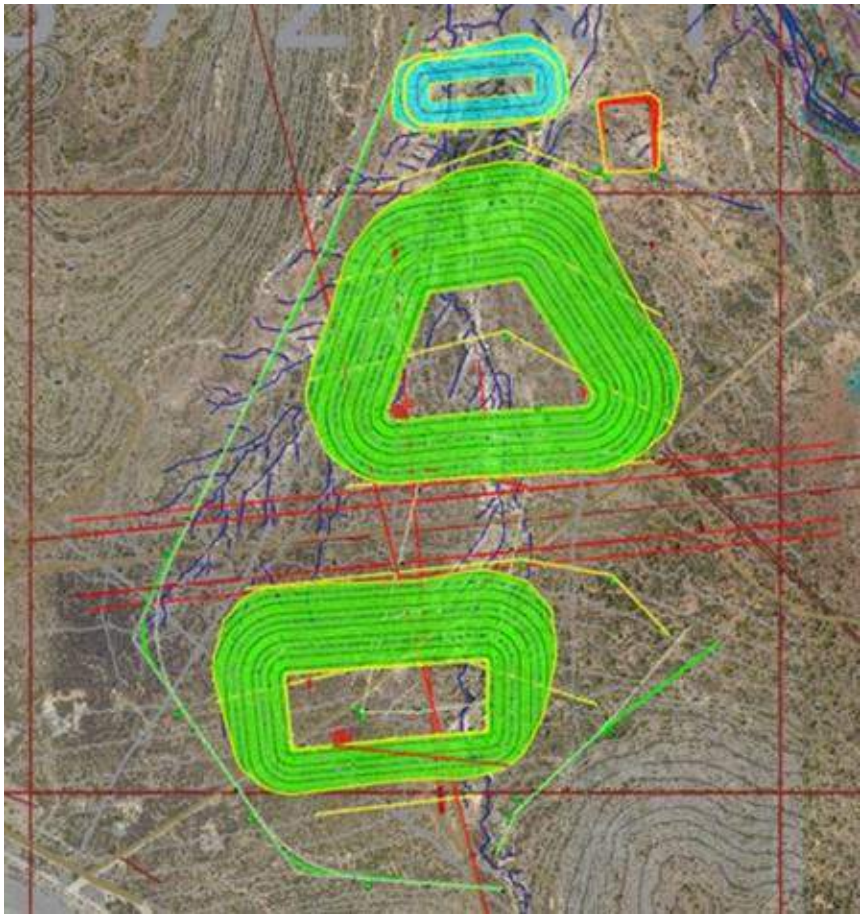


Figure 12: Site C Layout

Engineering constraints identified includes:

- Eskom servitude and TRP pipeline (this will split the site into two compartments);
- Underground mining is present (limit to 100m depth);
- Smaller powerlines will require removal; and
- Ruins/graves are present.

1.h.i.4 Site D (TSF Option D)

This location is traversed by a non-perennial drainage channel, which is an unnamed tributary of the Dwarsrivier. The site is located 1.4km (pipeline route 1.8km) up-gradient to the east of the plant, near the existing North TSF. The vegetation comprises of grass and trees, with protected species present.

The site is 29m above the Plant, which provides the most constraints in terms of elevation of the three (3) options.

This site will require a RWD of about 66 000m^3. The current engineering considerations identify the location of the RWD not as ideal due to the proximity of the non-perennial channel and the challenge of construction of storm water management berms.

The conditions of Site D are as follows:

- Site D is located to the north of the Beneficiation Plant. The site is adjacent to the existing North TSF and partially hidden behind the mountain 'koppie';
- The site has a surface area available for siting a TSF within a valley between mountains;
- The site is located approximately 1 500m from the 1:100-year flood line of a river towards the west of the site, but within a non-perennial drainage channel;
- A portion of the identified area will be located over backfilled areas (on the western side);
- There are mining activities up-gradient and to the east and northeast of the site.

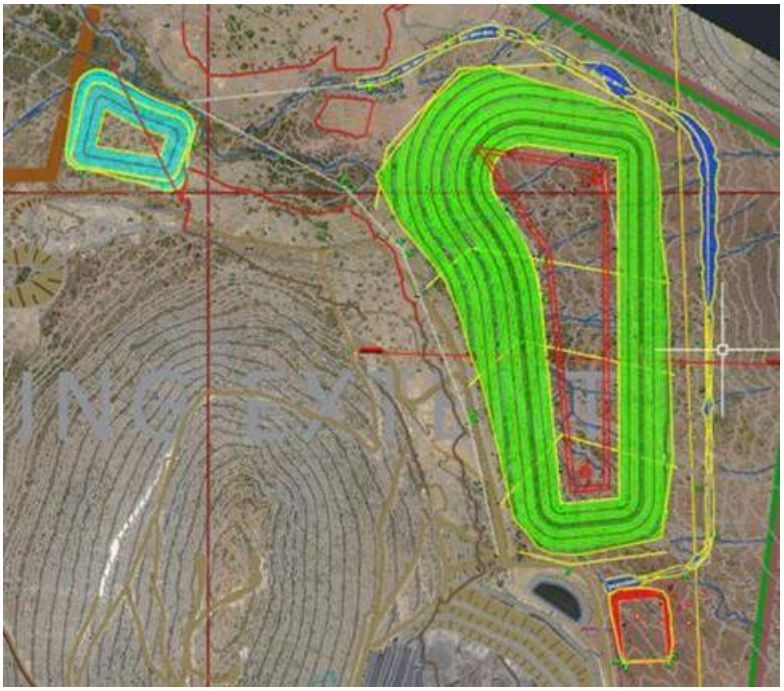


Figure 13: Site D Layout

Engineering constraints identified includes:

- Diversion of non-perennial stream;
- Lion ropeway currently planned in this area;
- Hillside; and
- Backfilled opencast pits.

1.h.i.5 Outcomes of the Site Selection

For the detailed Site Selection Report, please refer to Annexure 5.

The outcomes of the Site Selection are presented in the table below.

Table 16: Site Selection Matrix (1 preferred, 3 least preferred)

Discussion	Site B	Site C	Site D
Engineering			
Engineering considerations, including topography	1	3	2
Engineering Outcomes	**1**	**3**	**2**
Environmental			
Soils, Land Use and Land Capability	2	3	1
Terrestrial Ecology	1	3	2
Hydrology/ Surface Water	1	3	2
Hydrogeology	2	3	1
Freshwater Resources (wetlands)	1	3	2
Visual Character	3	2	1
Air Quality	2	3	1
Heritage	2	3	1
Socio-Economic	1	1	1
Ranking	15	24	12
Environmental Outcomes	2	3	1

The following concluding statements were received from the specialist reports:

Soils, Land Use and Land Capability: Taking the above into consideration, from a soil, land use and land capability perspective, Site D is recommended as the preferred site for TSF development, in comparison to the other two (2) TSF alternatives given the proximity to existing mining infrastructure, thus eliminating the need for significant further disturbance of undisturbed soils in other areas within the mining area. However, considering the location

of Site B and the fact that this is also located in close proximately to the mining activities, it is the view of the EAP that either Site B or D would be suitable options. As a result, Site B is also highlighted for consideration.

Terrestrial Ecology: from a long-term ecological maintenance perspective Option B is deemed to be the preferred option, as this site is already disturbed, is located adjacent the current mine operations and will not lead to the loss of habitat connectivity. This option does however pose a potential risk to the Groot Dwars River, which needs to be investigated in terms of mitigatory and management requirements.

Hydrology/ Surface Water: The site selection assessment indicated that the most preferred option from a surface water perspective is Site B, followed by Site D and C, respectively.

Hydrogeology: Site B scored similar to Site D and could therefore also be considered as a preferred alternative, provided that the risks identified are managed to avoid or minimise negative impacts on groundwater. The risks associated with Site B include the presence of the alluvial aquifer under or near the TSF footprint, the presence of potential preferential flow paths to groundwater and shallow groundwater level conditions.

Freshwater Resources: The construction of the proposed TSF within Option C or Option D has the potential to have an unacceptably high impact on the watercourse within each respective site. Such impacts may also potentially affect downstream systems. From a freshwater ecological perspective therefore, Option B is the preferred option, as no direct impacts arising from the construction and operation of the TSF within that location to the receiving freshwater environment are anticipated. Nevertheless, indirect impacts, including potential failure of the TSF, could occur and may potentially be detrimental to the Dwars River specifically, if suitable mitigation measures are not strictly implemented throughout all phases.

Visual Character: Site C has the smallest visible area and least number of visual receptors impacted, and is therefore ranked 1 (most favourable), followed by Site B and then Site D. Although Site C is the most favourable in terms of the criteria used to assess the TSF site alternatives, it must be noted that all alternatives fall within an area dominated by mining activities and infrastructure. Due to the visual aesthetics and sense of place of the area being previously altered from rural bushveld to mining, it is unlikely that the implementation of any of the TSF options would result in a significant visual impact.

Air Quality: This study comprises an environmentally conservative/'worst-case' air quality impact assessment and did not find predicted pollutant concentrations to exceed regulated ambient air quality standards. Further, impacts predicted at Site D were anticipated to be the lowest and as such, it is recommended that the proposed TSF be located at Site D.

Heritage and Palaeontology: Site D is the preferred site from a heritage point of view, but Site B can also be considered as this was previously agricultural land. Site B and D has previously been disturbed. For Site D, no heritage resources were identified inside the footprint area of this proposed TSF site alternative. At Site B, the stone wall foundations of a ruin and a possible Early Iron Age site was recorded. The study area is however disturbed, possibly by previous cultivation reducing the significance of the recorded finds. It should be noted that a cemetery occurs on the periphery of the site (Site C), and this area should be demarcated and avoided.

From a heritage point of view the heritage sensitivity associated with Site C is considered to be high due to the high number of sites in the impact area and this alternative is not recommended for the proposed development. It is recommended that the selected site should be subjected to a Heritage Impact Assessment.

Socio-Economic: It is concluded that either Site B, Site C or Site D would be most preferential from a socio-economic perspective.

Conclusion:

As mentioned before, the demand for chrome has increased globally due to the increase in China Markets. Not allowing the development of the proposed Khulu TSF to take place will result in production capabilities of the mine being hampered as space for tailing material would be severely restricted. With the current TSF reaching its life of mine, a new facility is required to ensure ongoing mining and processing practices. Based on the site selection and taking all environmental aspects assessed and discussed above into consideration, Site B is the preferred site from an engineering design. Site C and Site B is very similar in rating and both could be considered as preferred options. However due to the location of the Site B to the plant and a more disturbed area, Site B is also recommended.

This Site B is located in close proximity to the existing Discard Dump. One key area for consideration based on the outcomes of the initial specialist studies are the management of groundwater should Site B be chosen. The underlying lithology at this site is potentially alluvium associated with the Dwars and Groot Dwars Rivers, which

creates a major regional aquifer (this will be confirmed during the EIA phase of the project). Dwarsrivier Mine currently abstracts groundwater from this aquifer from BH D1 and D2, situated 725m southwest from Site B. Site B is not currently undermined, but future underground mining is planned for this area. Site B is furthermore underlain by both a fault and a dyke. These structures may act as preferential flow paths to groundwater. Dwarsrivier Mine is in the process of drilling and testing monitoring boreholes that target the dyke and fault present in order to quantify the extent to which these structures could act as preferential flow paths. The results of the drilling and testing programme are not yet available, but will be considered as part of a detailed geohydrological impact assessment to be completed for the project. The site is potentially situated within an existing watercourse (considering the alluvial aquifer), which suggests that shallow groundwater conditions may occur during the wet season. The site is also situated on or near the alluvial aquifer associated with the Klein and Groot Dwars Rivers. This must be confirmed should this site be developed further. Groundwater in this area has already been impacted by the historical TSF, the Plant and the discard dump. The Total Dissolved Solid (TDS) and nitrate (NO_3) concentrations in the nearest borehole (DRM3) confirm the poorest groundwater quality conditions for the four sites evaluated. The depth to groundwater at this site is the shallowest of all the sites evaluated (4,53m), which means that the barrier between the TSF and the aquifer is the smallest for all four sites. It is not thought that groundwater levels would rise to surface and thus into the liner system. The shallow groundwater is however flagged as a potential risk. Groundwater is not used in the immediate vicinity of Site B other than being monitored.

With the correct management measures, impacts identified could be addressed.

1.h.ii The type, design and/or technology/operational considerations of activity to be undertaken

The material parameters of the tailings to be deposited at the existing TSF allowed a cyclone method of deposition; however there are other deposition methods available for consideration where it may be rendered impractical to utilise the cyclone method. The available generally utilised tailings disposal methods include:

1.h.ii.1 Impoundment disposal facility

The method involves a containment wall constructed from foreign material, where the tailings material is deposited safely in to the containment. This includes in-pit disposal methods where open pits or underground shafts are utilized to dispose the tailings material. This method has advantages including less emphasis on rate of rise, generally pore pressure dissipation complications are less critical. However the greatest disadvantage with the method is high costs of progressively and continuously raising the impoundment walls. The impoundment disposal method is relatively simplified in terms of deposition, where generally open ended deposition is adequate.

1.h.ii.2 Spigot disposal facility

The spigot disposal method is generally in popular use, however there are limitations with regards to the rate of rise (i.e. approximately 2.5m/yr.). The method generally results in self-raising the tailings storage facility with the tailings material. The operations must ensure freeboard availability as required in GN 704 of the NWA. Since the tailings material is generally deposited hydraulically cycles must be imposed to deposition to allow the tailings material to consolidate. The spigot disposal method requires specific infrastructure and operating conditions for success.

1.h.ii.3 Cyclone disposal facility

The cyclone method of deposition comprises separation of a total tailings stream into fine grained tailings (overflow) and coarse grained tailings (underflow). Similar to the cyclone wall development, the method involves utilizing the tailings material for side wall building. The operator of the TSF must maintain freeboard similar to the spigot deposition method. The advantage with the method is high allowable rates of rise. The methods generally result in stable TSF due to the outer coarse material. The method requires specific infrastructure and operating condition for success.

Depending on the final location, the detailed type of TSF will be designed. This will be included into the EIA phase of the project.

1.h.ii.4 Filter press method

The filter press methods involve equipment used in liquid/solid separation. The filter press separates liquids and solids utilising pressure filtration. A slurry/slimes is pumped into the filter press and is dewatered under pressure. The filter cake will be deposited via trucks or a conveyor system onto the TSF, and water will be recirculated to the plant or proposed RWD. The filter press will be designed based on the volume and type of slurry that needs to be dewatered.

This is currently considered the preferred technology, due to the reduction in water to be stored on the proposed TSF, and also the opportunity to recycle water through the plant.

Depending on the final location, the detailed type of TSF will be designed. This will be included into the EIA phase of the project.

1.h.iii The option of not implementing the activity

Should the project not be approved (No Go Option) the following implications may arise:

As mentioned before (Section 1.f.i) the demand for chrome has increased globally due to the increase in China Markets. With the current TSF reaching its operational capacity, a new facility is required to ensure ongoing mining and processing practices. Without this facility, the mine will not be able to continue with beneficiation processes and the primary mining activities. This will result in a severe loss of the beneficiation of chrome and optimal mining of chrome in terms of the approved Mining Works Programme, income to the local municipality, loss of employment opportunities, and loss of opportunities in terms of the Social and Labour Plant contributions the mine is making into the Local Municipality.

The other Capital Projects are required for the safe and logistically efficient operation of the mining operations.

1.h.iv Details of the Public Participation Process Followed

Public participation is understood to be a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the Scoping and Environmental Impact Reporting (S&EIR) process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project.

The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the Proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues and solutions.
- In accordance with the NEMA, GNR 982, Chapter 6, the following activities have taken place or are proposed to take place within the Draft Environmental Scoping Report review period or beyond:

1.h.iv.1 Stakeholder Identification

The public participation process must include consultation with (1) the competent authority, (2) every state department that administers a law relating to the matter, (3) all organs of state which have jurisdiction in respect of the activity to which the application relates, (4) all potential, or, where relevant, registered interested and affected parties. In order to satisfy this requirement, the EAP will undertake the following consultations:

- Competent Authority - The DMRE is the competent authority related to this application. This submission of the application formed the first of the consultations with the DMRE. The EAP undertakes to engage in on-going communications with the DMRE (preferably directly with the allocated case officer).
- Departments that administer a law relating to the matter – The Department of Water Affairs (DWS) has been directly informed via email and telephonic conversations. DWS will be the competent authority due to a Water Use Licence Application (WULA) that needs to be submitted for the proposed project.
- All organs of state which have jurisdiction in respect of the activity to which the application relates:
- National Level: The Department of Forestry, Fisheries and Environment (DFFE) - Under the "One Environmental System" rolled out by Government on 8 December 2014, licensing processes for mining, environmental authorisations and water use have been streamlined. Under the One Environmental System, The Minister of Mineral Resources will issue environmental authorisations and Waste Management Licences (WMLs) in terms of the NEMA, and the NEMWA, respectively, for mining and related activities. However, note that under the One Environmental system, the Minister of Environmental Affairs will be the appeal authority for these authorisations to ensure complete independency to the competent authority.
- Provincial Level: Given that the activity is located within the Limpopo Province, the Department of Economic Development Environment and Tourism, Limpopo Province (LEDET) will form a primary commenting authority during the process. The provincial Heritage Resource authority has been informed about the proposed project.
- District Level The proposed project area falls within the jurisdiction of the Sekhukhune District Municipality. The Sekhukhune District Municipality was informed about the project as part of on-going spatial development planning and land use updates.
- Local Level: The Dwarsrivier Mine is located within the Fetakgomo Tubatse Local Municipality. The Municipality is responsible for managing the various wards associated with the Dwarsrivier Mine and surrounds. The associated wards include Wards 2, 6, 27, 28, and 30. The ward councillors will be a primary target for the proposed project in an effort to communicate the project to as greater stakeholder database as possible, especially considering the locals will be the most affected stakeholder grouping.
- All potentially registered I&APs - The existing Dwarsrivier Mine stakeholder database was used as a base starting point. The database was updated following any stakeholder request to be registered. The use of site notices, Notification Letters, Short Messaging Systems (SMS), email and fax were used as methods in which to reach potentially interested and affected parties.
- Affected Adjacent Landowners and Land Owners – As far as possible, all affected adjacent property owners were contacted and informed of the proposed new project at Dwarsrivier Mine. TPR was identified as the only affect landowner, as Portion 6 and 7 of the Farm Dwarsrivier 372KT belong to this mine. A Meeting has been scheduled with Two Rivers for 23 May 2018 in order to discuss any comments relating to mining activities associated with the new application. Hence a letter was also ready received from Two Rivers, confirming access to the specialist on the said affected properties. All comments will also form part of the final scoping report.
- Property Owners: Dwarsrivier Mine currently holds the mining rights over Portion 1 (RE), Portion 0 (RE) and Portions 6 and 7 of the farm Dwarsrivier. Surface rights of the mine extends onto Portion 1 (RE), Portion 0 (RE), and Portion 4 (a portion of Portion 3) of the Farm de Grooteboom 373KT. The surface rights of Portions 6 and 7 of the farm Dwarsrivier 372KT are owned by TRP.

The latest stakeholder database is included within this report as Annexure 4.

All registered I&APs, which have a direct affect/effect on the proposed project or are directly or indirectly impacted by the proposed project, have the right to lodge a comment/question on the project (until such time that the appeals process comes to a close).

1.h.iv.2 Stakeholder Identification and Notification

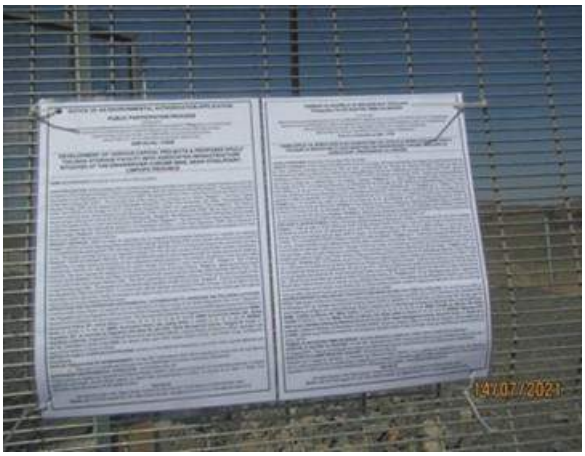
Please refer to Annexure 4 for copies of these notifications. Proof of email submissions can be requested from the EAP.

1.h.iv.3 Site Notices

In accordance with GNR 982 Section 41(2)(a-b) a site notice was developed (see below, proof of placement) and placed at three locations, in order to inform surrounding communities and adjacent landowners of the proposed

projects, the site was placed on 15 July 2021) and at visible locations close to the site. Site Notices were place at the following locations:

Fetakgomo/Greater Tubatse Local Municipality



Site B Option Entrance (Project 1)

Main Entrance (Project 3)

Site C Option & Emulsion and Diesel Batching Entrance (Project 1 and 2)

North Mine Entrance (Project 5)

Plant Entrance (Project 4 and 5)

1.h.iv.4 Background Information Documents

Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail and fax through the submission of the Background Information Document (BID) and Registration Sheet:

- Authorities;
- Municipalities;
- Residential Associations;
- Non-governmental organisations;
- General Public;
- Parastatals / Service providers, and
- Adjacent Landowners.

Please refer to Annexure 4 for a copy of the BID.

1.h.iv.5 Advertisements

In accordance with GNR 982 41(2)(c) of Chapter 6 an advert was placed in

- The Steelburger Newspaper on 15 July 2021.

There are many local languages spoken in the area, of which Sepedi is the most prevalent. English is considered a universal language; therefore, the newspaper advert was placed in English only. The site notices were however translated into Sepedi. The proof of advert will be attached Annexure 4.

Should the EAP note an affected stakeholder and be made aware of his/her existence by the ward councillor, or traditional leader, efforts will be made to ensure his/her participation in the stakeholder engagement process [as required by Section 41(2) (e) of Chapter 6].

In addition to the minimum requirements outlined in GNR 982, the EAP has undertaken the following:

- Distribution of notification letters to Dwarsrivier stakeholders via email and fax (where contact details are available).

Any stakeholder who submits a comment along the course of the S&EIR process will automatically be registered on the project-specific stakeholder database.

Please refer to Annexure 4 for a copy of these adverts.

1.h.iv.6 Document Review

The Draft Scoping Report will be placed on public review for a period of 30 days from **23 July 2021 to 23 August 2021**. Printed copies were available at:

- Dwarsrivier Mine (Pieter Schoeman).

Electronic Copies are available from:

- Public Participation Office via Dropbox link.

and

- Contact Batho Earth to request a copy on CD.

Hard copies of the Draft Environmental Scoping Report were couriered to the following authorities:

- LEDET – Ms Mokgadi Mogashoa
- DWS (Limpopo): Ms Portia Munyai
- DFFE (Limpopo): Ms NA Mudau
- SAHRA: On Line submission.
- Fetakgomo Tubatse Local Municipality: LED Manager Mr. N. Mokgotho
- The BID was also mailed to the Department of Commission on Restitution of Land Rights: Mr Mmakolobe Mononyane

1.h.iv.7 Stakeholder Meetings

A stakeholder meeting will be arranged once the Scoping Report review period has been concluded should this be required by stakeholders. It should be noted that due to the COVID restrictions this meeting may be held remotely.

1.h.iv.8 Summary of Issues raised by the I&APs

The Issues and Responses Register includes the comments received during the Stakeholder Consultation Process undertaken for the proposed projects. This includes responses to the advertisements, response sheets, individual discussions with key stakeholders, and any other comments received during the project timeframe up to 23 August 2021.

Comments reported within this Issues and Response Register were updated during the project. This document can therefore be considered as an active document up until the final reports are submitted. To date the following comments have been received.

Table 17: Stakeholder Comments received

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	At the time for the submission of the draft report to stakeholders, no comments have been received.			
	All comments received during the review of the draft report will be included into the final report.			

1.h.v The Environmental Attributes associated with the Alternatives

As no significant changes in the location of infrastructure have been required based on the alternative discussions to date, the environmental attributes associated with the current site locations are presented.

1.h.v.1 Baseline Information

1.h.v.1.a Climate

WSP Consulting was appointed to undertake the Air Quality Assessment and Hydrospatial to undertake the Hydrological Assessment. The climatic information was sourced from these reports, as well as available information on site.

1.h.v.1.a.1 Temperature

The mine is situated in the Highveld Climate Region of South Africa. The average daily maximum temperature for summer (January) is 27 degrees Celsius (°C) and for winter 17°C. The average daily minimum temperatures vary between 13°C in January and 0°C in July. In terms of the 2019 Air Quality Site Selection Report, the highest monthly average temperature for 2015, 2016 and 2017 was 22.46, 21.84 and 21.65°C, respectively, recorded during summer. The lowest monthly average temperature for 2015, 2016 and 2017 was 12.36, 12.77 and 13.09°C, respectively, recorded during winter.

1.h.v.1.a.2 Rainfall

The Mean Annual Precipitation (MAP) on the project area is estimated to range between 401 and 600mm per annum; while the small portion of the study area ranges from 601 to 800mm. The mine receives most of its rainfall during the summer months.

1.h.v.1.a.3 Humidity

According to the 2019 Air Quality Site Selection Report, the humidity in the region is moderate to high, with the annual average for 2015, 2016 and 2017 being 65.13, 66.94 and 63.13 %, respectively.

1.h.v.1.a.4 Evaporation

The table below summarises all the different evaporation figures for the site area.

Table 18: Evaporation Summary

Type of Rainfall	Amount (mm)
Mean Annual Evaporation	1677

The MAP is less than the Mean Annual Evaporation (MAE) and therefore the project area is classified as a water deficit site.

1.h.v.1.a.5 Wind

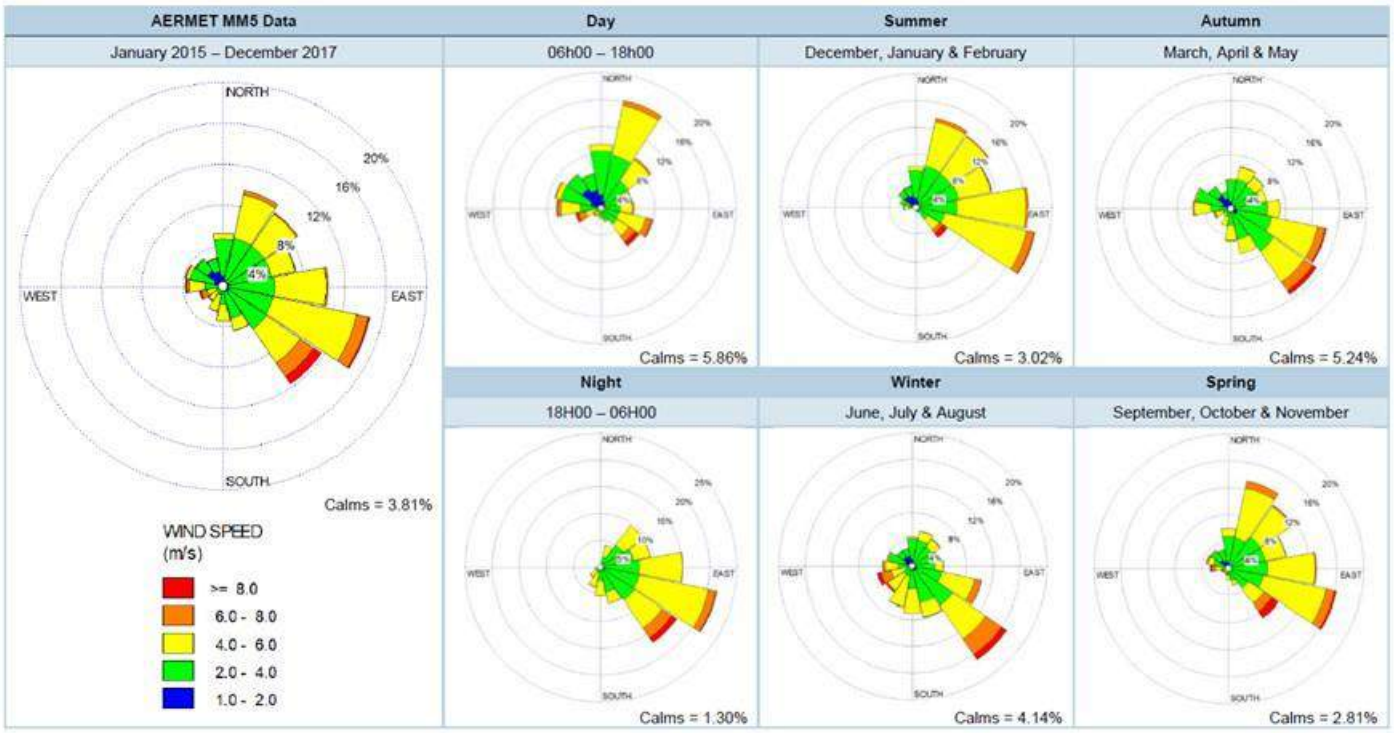
Wind can play an important factor in the potential distribution of fugitive dust resulting from the site. As the mine is situated in the Dwarsrivier valley, this factor gives rise to winds that are variable in terms of both speed and direction.

Wind roses (see the following figure) summarize wind speed and directional frequency at a location. Each directional branch on a wind rose represents wind originating from that direction. Each directional branch is divided into segments of colour, representative of different wind speeds.

Typical wind fields are analysed for the full period (January 2015 – December 2017); diurnally for day (06h00–18h00) and night (18h00–06h00); and seasonally for summer (December, January and February), autumn (March, April and May), winter (June, July and August) and spring (September, October and November).

- Calm conditions occurred 3.81% of the time;
- Moderate winds from the east-south-east prevailed in the region with notable north-north-easterly, easterly and south-easterly components;

- Highest average wind speeds occurred from the south-east;
- North-north-easterly trajectories prevailed during the day while east-south-easterly trajectories prevailed at night;
- East-south-easterly winds prevailed during spring and summer, while south-easterly winds prevailed in winter and autumn; and
- Highest average wind speeds occurred in spring.



Graph 1: Wind data.

1.h.v.1.a.6 Extreme Weather Conditions

The incidents of extreme weather conditions for this area are included in the following table.

Table 19: Extreme Weather Conditions.

# of Days With	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Days Per Yr.
Thunder	6.	4.4	3.7	2.7	0.9	0.5	0.4	1.1	1.4	4.1	7.1	5.1	37.6
Hail	0.3	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.5	0.2	1.9
Fog	1.9	1.3	1.1	0.9	0.4	1.1	0.8	1.1	0.8	2.6	1.6	1.6	15.2
Snow	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.6

1.h.v.1.b Topography

Hydrospatial was appointed to undertake the Hydrological and Visual Assessment. The topographic information was sourced from these reports, as well as those of the available information on site.

The farm Dwarsrivier 372KT, on which the mine is located, is traversed by the Groot Dwarsrivier and the Klein Dwarsrivier. The confluence of these rivers is also located on the property. The eastern portion of the property, where the chrome reserves outcrop, generally slopes in a westerly to south westerly direction, towards the Dwarsrivier. Adjacent to the river, slopes are gentle, in the order of 3°. Further upslope from the river, slope angles increase to as much as 40°.

However, the slopes are not always gradual with frequent small to relatively large koppies or hills formed from more resistant materials. Elevations on the farm Dwarsrivier vary from 900 – 1,200m. The area generally drains

in a northerly direction, via the Dwarsrivier systems on site. There are, however, a number of small westerly flowing, non-perennial tributaries of the Dwarsrivier in the vicinity of the old open cast sections. There is approximately 40m elevation change across the mine site, with elevations between 940 – 975 metres above mean sea level (mamsl).

1.h.v.1.c Geology

iLEH was appointed to undertake the Hydrogeological Assessment The geological information was sourced from these reports, as well as available information on site.

Dwarsrivier Mine is situated in the eastern limb of the 2052 Ma (million year old) Bushveld Igneous Complex, the world's largest layered intrusion, comprising the emplacement of at least 7 x 105 cubic kilometres (km^3) of magma into the sediments of the Transvaal Supergroup. The chrome ore deposits form part of the Critical Zone of the Bushveld Complex. The chrome horizon that gets mined is referred to as the LG 6 (Lower Group 6) horizon. The chrome layer is overlain by anorthosite and pyroxenite. The layers have a regional dip of 13° west in this area, towards the centre of the Bushveld Igneous Complex. However, local variations in dip are common.

The Dwarsrivier ore body represents an open-ended structural synform, with a north-south orientated axis that plunges gently to the south. The mine is situated on the eastern limb of this synform. The geology overlying the chromite generally comprises pyroxenite and anorthosite. Please refer to the following figures for the geological settings.

Specific to the various TSF options the following should be considered:

The underlying lithology at Site B is alluvium associated with the Dwarsrivier and Groot Dwarsrivier, which creates a major regional aquifer. Dwarsrivier Mine currently abstracts groundwater from this aquifer from BH D1 and D2, situated 725m southwest from Site B (see Figure 15). Site B is not currently undermined, but future underground mining is planned for this area. Site B is furthermore underlain by both a fault and a dyke.

Site C is underlain by alluvium that forms part of the regional alluvial aquifer associated with the main rivers in the area, as for Site B. Site C is situated south of the Dwarsrivier Mine mining surface infrastructure, but is underlain by the existing underground workings at South Shaft. South Pit is situated 550m northeast of the site. The existing Two Rivers Platinum (TRP) TSF is situated approximately 150m southwest of this site. The site overlies a fault identified by GAP (2018), but the nearest dyke is 120m to the east (see Figure 15).

Site D is situated immediately north of the existing North TSF (see Figure 1). The regional geological map suggests that the footprint is situated partly on alluvium and partly on norite/anorthosite. This footprint is partially underlain by an old backfilled and rehabilitated opencast pit. It is however noted that the North TSF also overlies an old pit, which suggests that this situation can be overcome through implementation of the appropriate engineering solutions. This site is not underlain by the faults or dykes identified by GAP (2018) (see Figure 16).

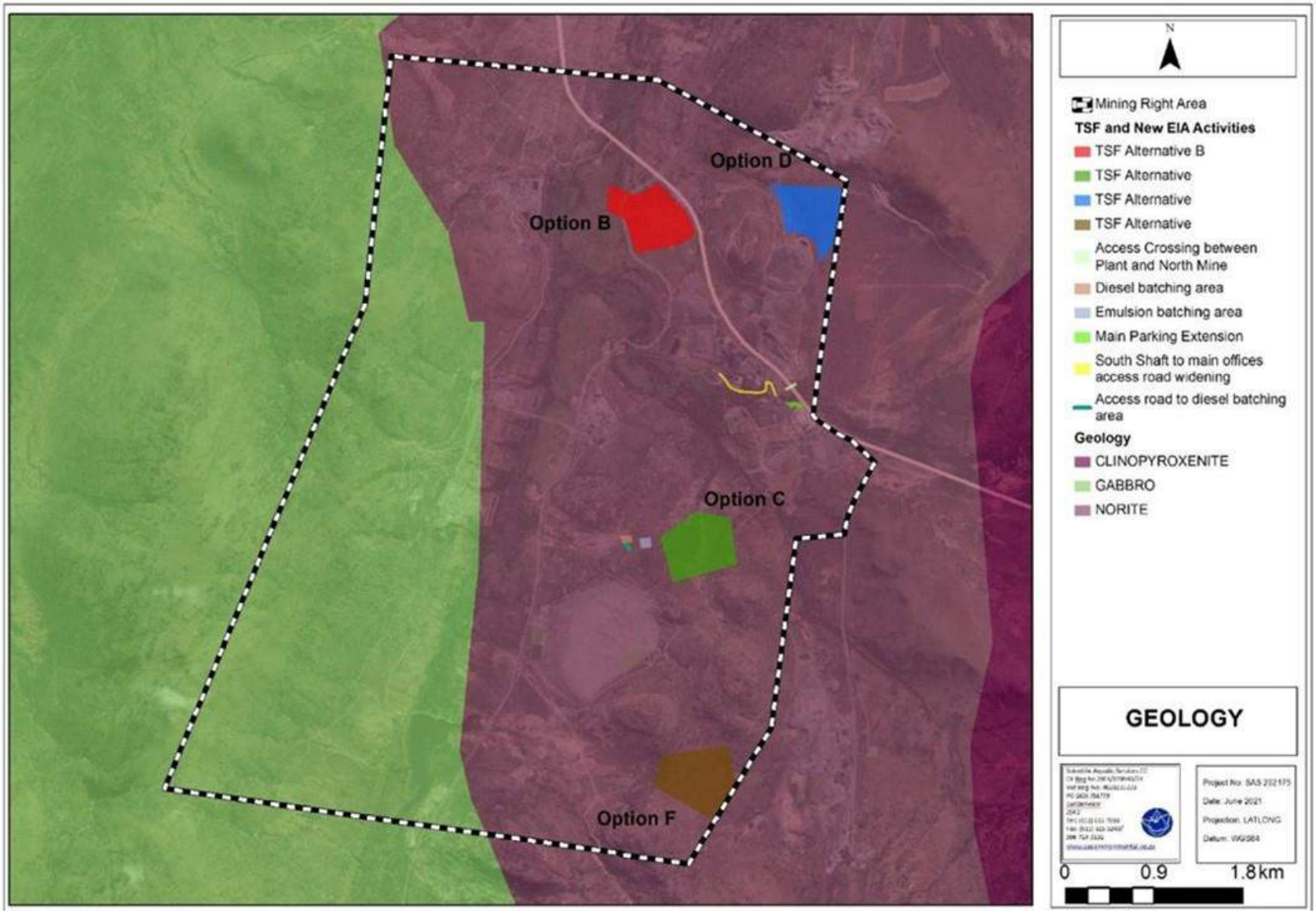


Figure 14: Geology of the Dwarsrivier Mine and TSF site alternatives.

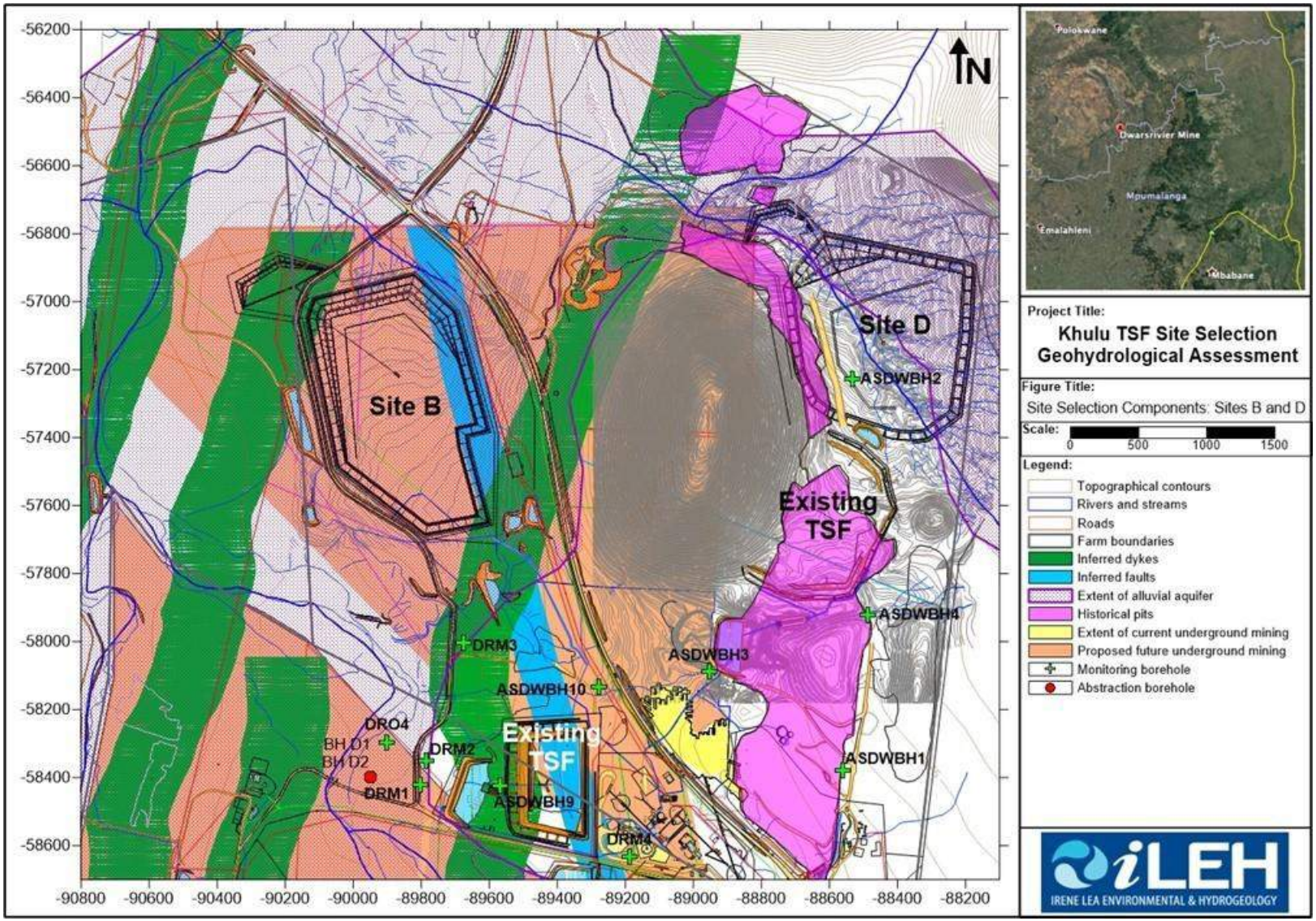


Figure 15: Geological Structures of the Dwarsrivier Mine and TSF site alternatives (Site B and D)

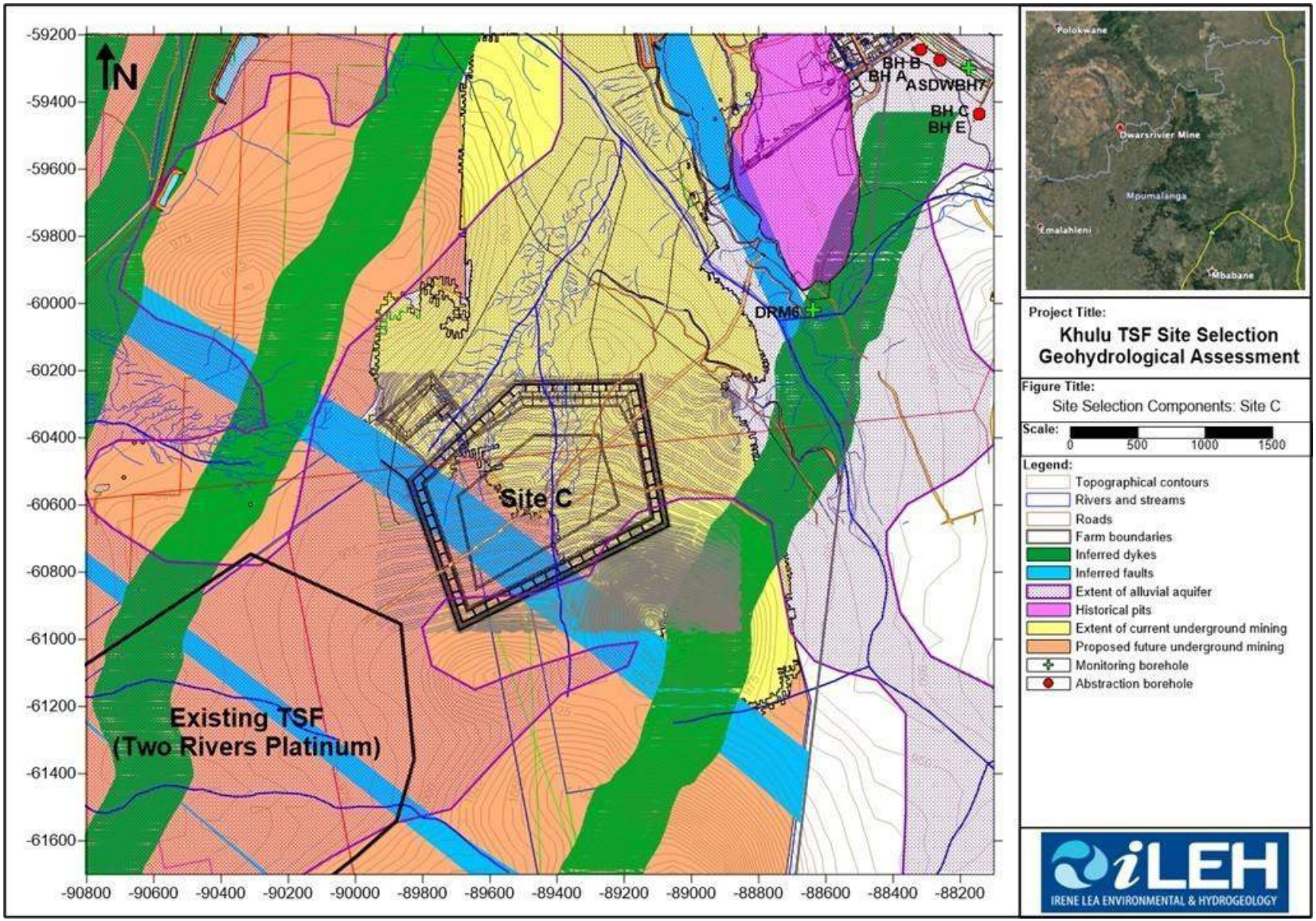


Figure 16: Geological Structures of the Dwarsrivier Mine and TSF site alternatives (Site C)

1.h.v.1.d Soils and Land Capability

SAS was appointed to undertake a Soils, Land Use and Land Capability Assessment to provide input in terms of the soil characteristics on site for the site selection process (please refer to Annexure 5). The soil information was sourced from this report, the Topsoil Balance study undertaken by GCS during 2016, as well as from existing available information pertaining to Dwarsrivier Mine.

The following data is applicable to the mine in general, according to various data sources including, but not limited to, the Agricultural Geo-referenced Information System (AGIS) and the Limpopo Conservation Plan (2013) databases:

- The Soil and Terrain (SOTER) database indicates that the majority of the mine comprises strongly weathered acid soils with low base saturation, classified as Luvisols (LVk) with the remaining portions classified as Lithic Leptosols (LPq);
- The desktop assessment indicates that the majority of the mine has a moderate potential arable land capability (class III). While the remainder of the mine is suited to Wilderness land use (class VIII), as illustrated in Figure 19;
- According to the AGIS database, the livestock grazing capacity potential is estimated to be approximately 6 hectares per large animal unit (Morgenthal et al., 2005);
- The natural soil pH is estimated to be range between 6.5 and 7.4, indicating that the soils are anticipated to be slightly acidic to neutral, as interpolated from topsoil pH values obtained from the National Soil Profile Database (AGIS database);
- Geology 2001: According to the Geology 2001 dataset the majority of the mine is underlain by norite, while the remaining portion underlain by gabbro (Figure 14 and Figure 17**Error! Reference source not found.**);
- According to the SOTER database and the 1:250 000 geological map of South Africa, the majority of the Dwarsrivier Mine as well as the TSF alternatives are underlain by Pyroxenite rock formations while the remaining portion of the Dwarsrivier Mine located to the west and the southern portion of TSF alternative F are underlain by Gabbro. Refer to Figure 15.
- According to the Soils 2001 Dataset, the larger portion of the Dwarsrivier Mine is situated within an area where the soils are classified as prismacutanic and pedocutanic diagnostic horizons dominant. In addition, one or more of Vertic, melanic, red structured diagnostic horizons occur within this area. The remaining portion of the MRA is situated within “miscellaneous” land classes, rocky areas with miscellaneous soils, as depicted Figure 18;
- According to the Limpopo Conservation Plan version 2 (2013) (Figure 21) the majority of the project area is classified as a Critical Biodiversity Area (CBA) 1. CBA 1 areas are considered irreplaceable areas required to meet biodiversity and/or ecological processes targets, with no alternative sites available to meet these targets. One section of the western portion of the mine as well as the southern portion are considered to fall within a designated Ecological Support Area (ESA) 2. These are areas that are important for meeting ecological processes.

1.h.v.1.d.1 Land Use

Current land use activities associated with the proposed TSF alternatives are largely dominated by wildlife and wilderness, encompassed by some mining operations in the surrounding areas. No current agricultural activities were observed within the proposed TSF alternatives and the surrounding areas. Site B is however an old agricultural field which has been laid to fallow. All TSF alternatives equally experience a MAP of less than 600mm per annum, which is not considered adequate to support unirrigated cultivated agriculture on a commercial scale. Furthermore, all proposed TSF alternatives comprise soils not ideal for either cultivated agriculture nor grazing on a commercial scale. Even though Site D contains patches of arable soils, the viability of agricultural crop cultivation on these soils in this area is low due to the limited extent of arable soils and land fragmentation as a result of mining related activities in the surrounding areas.

Land Capability classes for soil forms identified with the proposed projects can be summarised as follows:

Table 20: Land Capability Classes

Land Capability	Soil Forms
Arable – Class II	Hutton (Hu)
Arable – Class IV	Brandvlei (Br)
Grazing – Class VI	Glenrosa (Gs) and Mispah (Ms)

Land Capability	Soil Forms
Wildlife/Wilderness (class VIII)	Witbank (anthrosols) (Wb)
Other	NA

According to the AGIS database, the livestock grazing capacity potential of the Dwarsrivier Mine and the three TSF alternatives is estimated to be approximately 6 hectares per large animal unit (Morgenthal et al., 2005).

1.h.v.1.d.2 Topsoil Balance

A Topsoil Balance study was conducted by GCS during 2016. The areas occupied by surface infrastructure are part of the sites that will need rehabilitation during the post-mining or closure phase of the mine.

The volume of topsoil required for future rehabilitation is indicated to be 110,309.1m^3 and this volume is in excess of the available topsoil volume which stands at 104,651.6m^3. This means that 5,657.5m^3 of additional topsoil is required to meet all rehabilitation obligations at the mine as shown in the following table:

Table 21: Topsoil balance (presented in m^3)

Available Topsoil	Required Topsoil	Topsoil Balance
104 651.6	110 309.1	-5 657.5

The topsoil deficit could be attributed to loss of topsoil from stockpiles through water erosion. The mine's final rehabilitation, decommissioning and closure plan, points out the possibility of conversion of brick buildings and infrastructure currently serving as offices to other beneficial use upon closure of the mine (GCS, 2016). If the aforementioned plan is finally implemented, the available topsoil will be sufficient for post closure rehabilitation since the area occupied by the brick buildings will no longer need any rehabilitation.

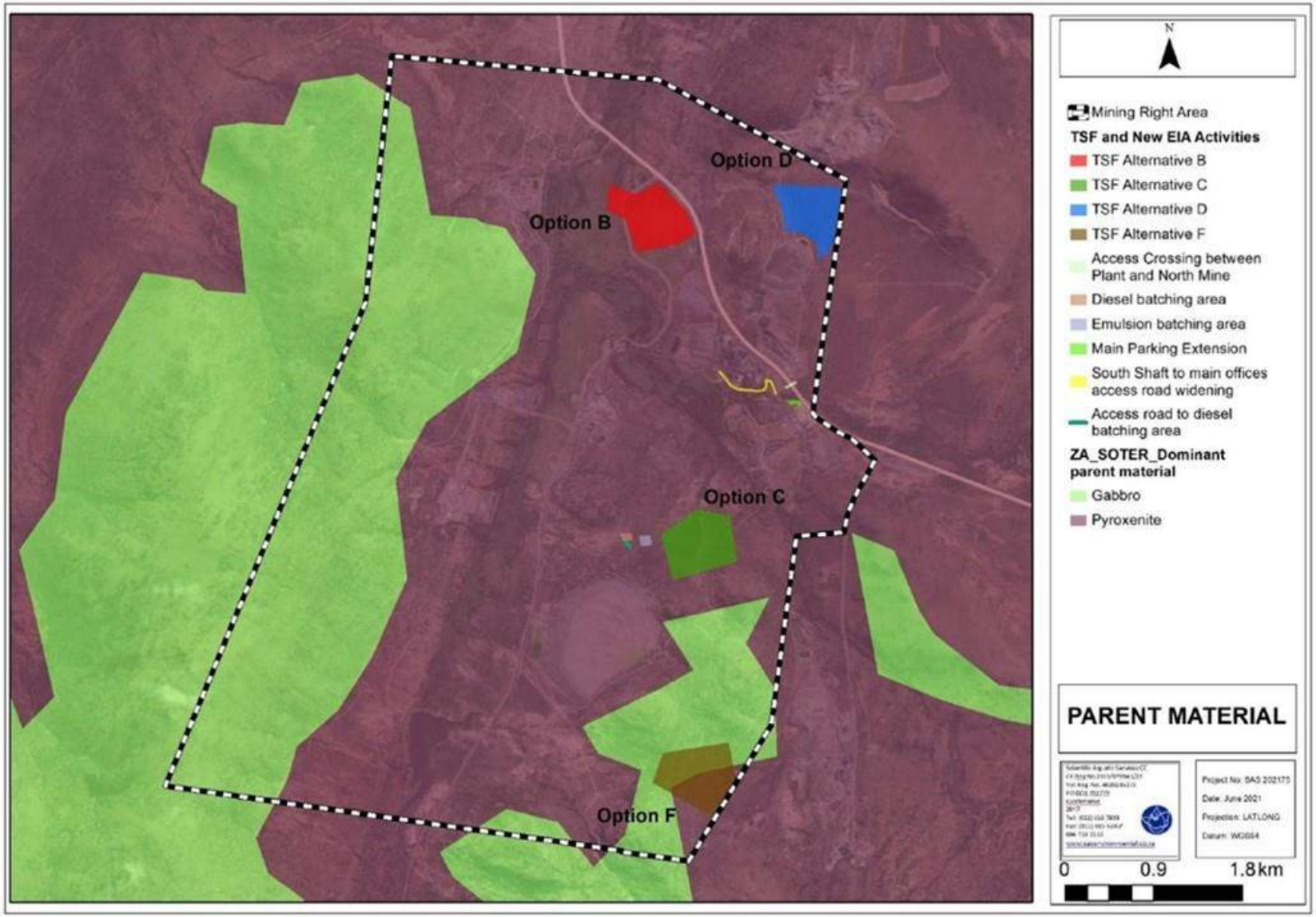


Figure 17: Parent material associated with the MRA and surrounding areas according to the SOTER database

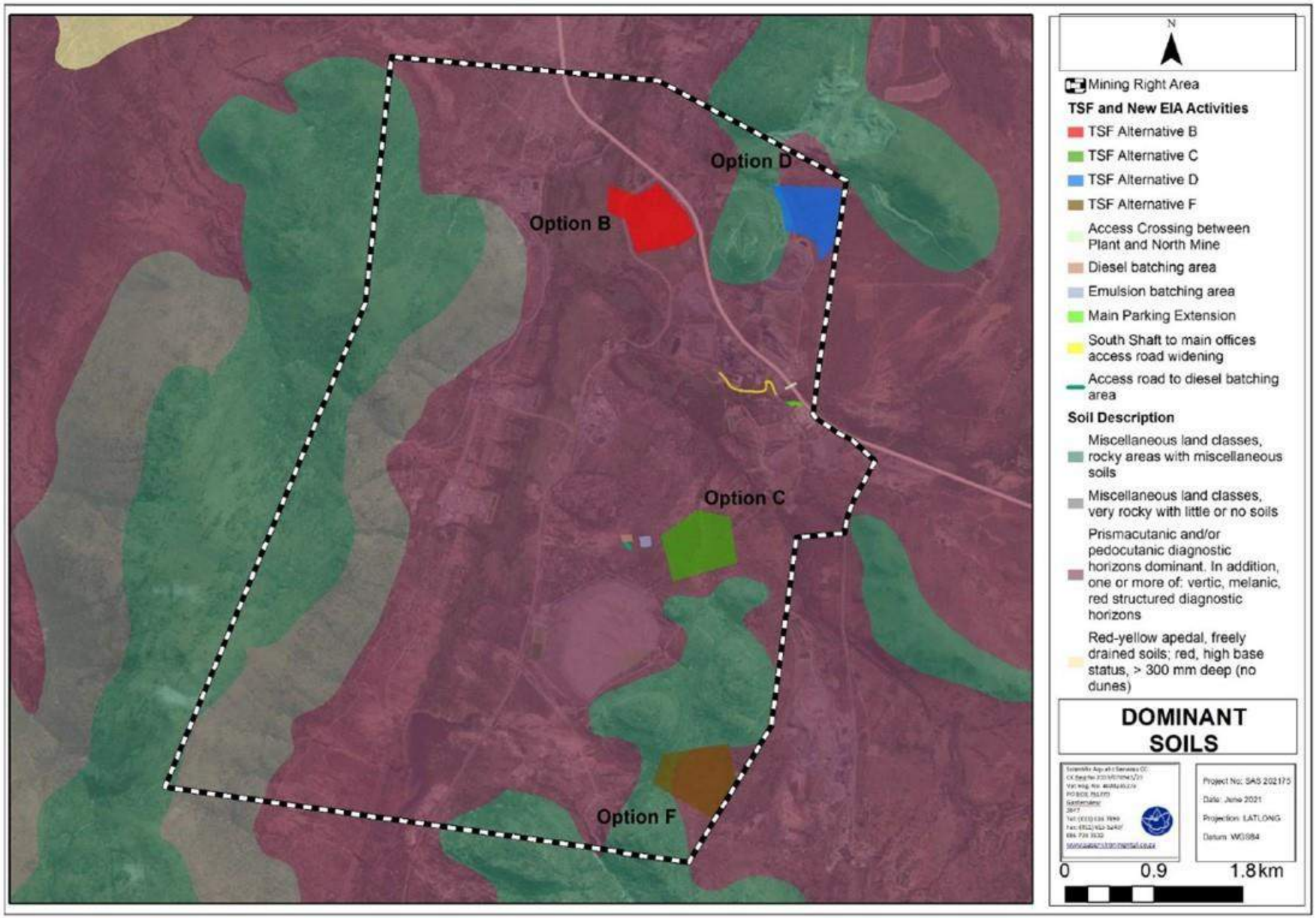


Figure 18: Dominant soils (2001) associated with the MRA and surrounding areas

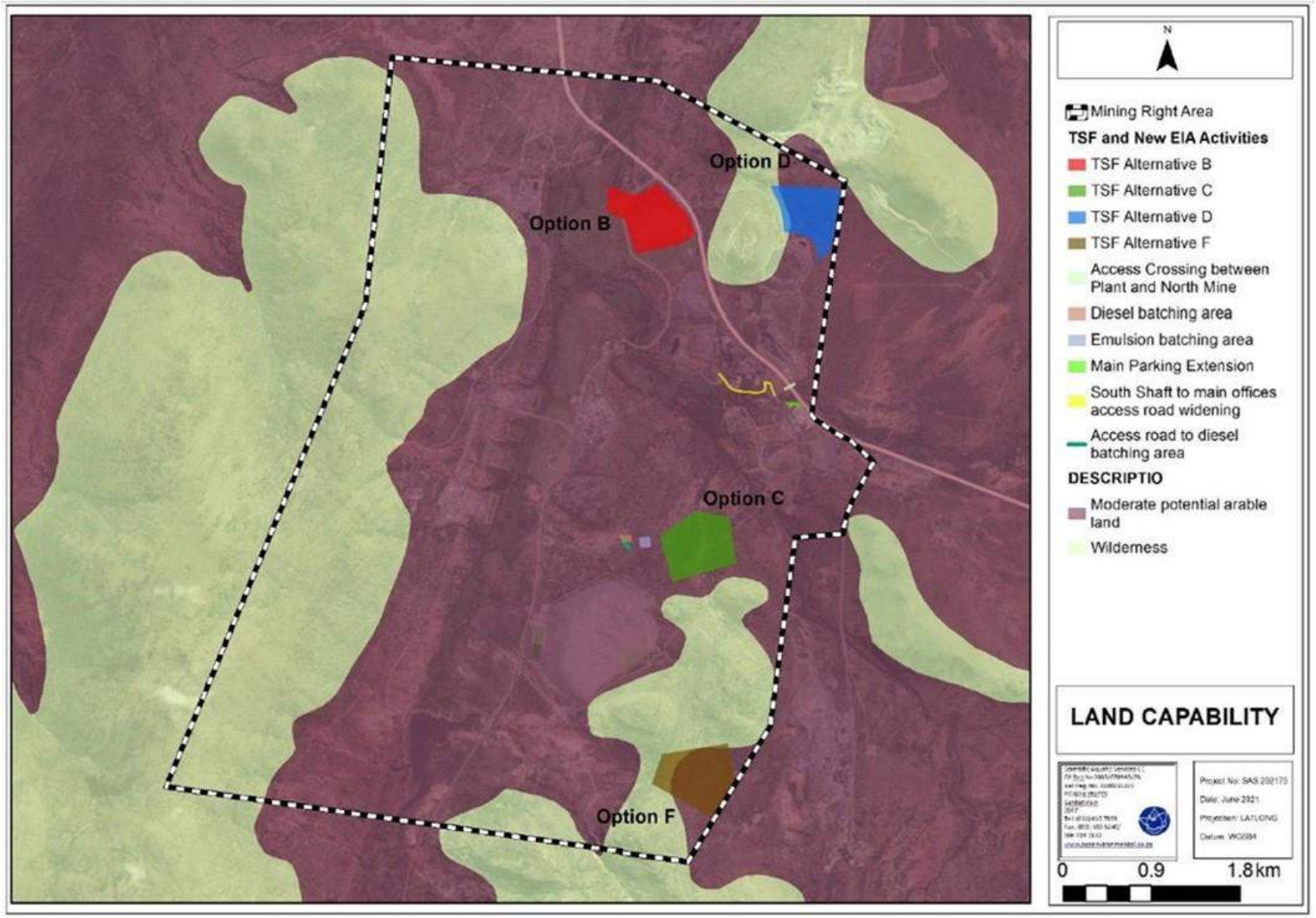


Figure 19: Land Capability

1.h.v.1.e Ecological Footprint

SAS was appointed to undertake the Ecological Assessment The ecological information was sourced from this report, as well as available information on site.

The Dwarsrivier Mine is located in the Savanna Biome, within the Central Bushveld Bioregion. Ecological aspects relating to the vegetation of the area indicate that the majority of the Dwarsrivier Mine is located within the Sekhukhune Mountainlands listed threatened ecosystem (Figure 20 and Figure 21), which is considered to be Endangered, and within the Sekhukhune Mountain Bushveld vegetation type which is considered Least Threatened. The vegetation and landscape features are considered as dry, open to closed microphyllous and broad-leaved savanna on hills and mountain slopes that form concentric belts parallel to the north-eastern escarpment. Open bushveld, often associated with ultramafic soils, which often provide habitat for a high diversity of edaphic specialists, is present on southern aspects. Bushveld located on mountain slopes is generally taller than in the valleys, with a well-developed herbaceous layer. Bushveld located within valleys and dry northern aspects is usually dense, like thicket, with an herb layer comprising many short-lived perennials. Dry habitats contain a number of species with xerophytic adaptations, such as succulence and underground storage organs. Both man-made and natural erosion dongas occur on the foot slopes of clay soils rich in heavy metals.

The Dwarsrivier Mine falls within an area that is currently not protected (Figure 22).

According to the South African Protected Areas Database (SAPAD; 2020) the mine is located approximately 9.7 km east of the De Hoop Private Nature Reserve (PNR), approximately 9 km southwest of the Berghoek PNR, and 11.6 km of the Steelpoort PNR (Figure 22). The National Protected Areas Expansion Strategy (NPAES, 2009) database does not indicate any formally or informally protected areas to be situated within 10km of the mine; however, it does indicate the Mpumalanga Mesic Grasslands Focus Area to be situated within the south-eastern corner of the mine (Figure 22).

In terms of the Mining and Biodiversity Guidelines (2013), it should be noted that the majority of the mining area, with the exception of a small area within the northern portion, falls within an area considered to be of Highest Biodiversity Importance (Figure 23). Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g. water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive necessary authorisations (Figure 23).

The proposed TSF Site Alternatives are all located within CBA 1 areas as well as an area of Highest Biodiversity Importance according to the Mining and Biodiversity Guidelines (2013). Overall, the habitat within each TSF Alternative is largely representative of the Sekhukhune Mountain Bushveld vegetation type. Several floral and faunal SCC were observed within each TSF Site Alternative, highlighting the ecological importance of each area (Figure 24). Sites C and D are located within areas which are considered relatively intact, and representative of the Sekhukhune vegetation type and as such differentiation between options cannot be made simply on habitat quality. Site B is located within an area that has been historically disturbed, lacking ecologically intact habitat. Development herein will lead to no loss of intact habitat or faunal and floral Species of Conservation Concern (SCC). The footprint is dominated by plant species indicative of disturbed areas as well as several alien plant species. For the area in which the diesel and emulsion batching is proposed, the vegetation is in an intact section of the Sekhukhune Bushveld habitat, and as such, will result in the loss of indigenous vegetation and potentially floral SCC, for which permits will be required. Faunal SCC, should they be present, will likely self-relocate. The other proposed capital projects are located in intact sections of the Sekhukhune Bushveld habitat, and as such, will result in the loss of indigenous vegetation and potentially floral SCC, for which permits will be required. Faunal SCC, should they be present, will likely self-relocate.

Figure 20: The remaining extent of the Sekhukhune Mountain Bushveld associated with the five proposed projects according to the National Biodiversity Assessment (NBA, 2018)

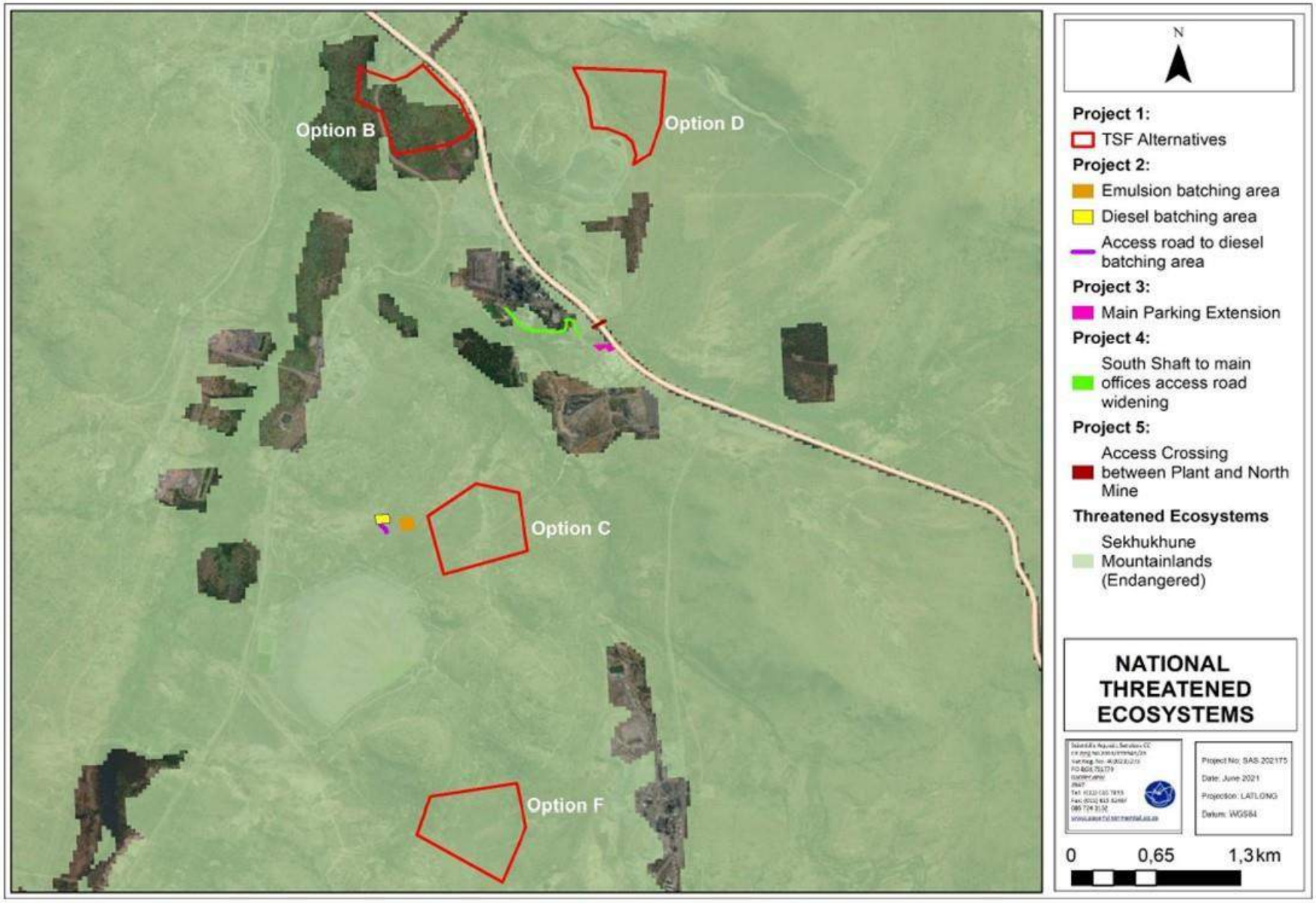


Figure 21: The Endangered Sekhukhune Mountainlands ecosystem associated with the mine and TSF site alternatives (National Threatened Ecosystems, 2011)

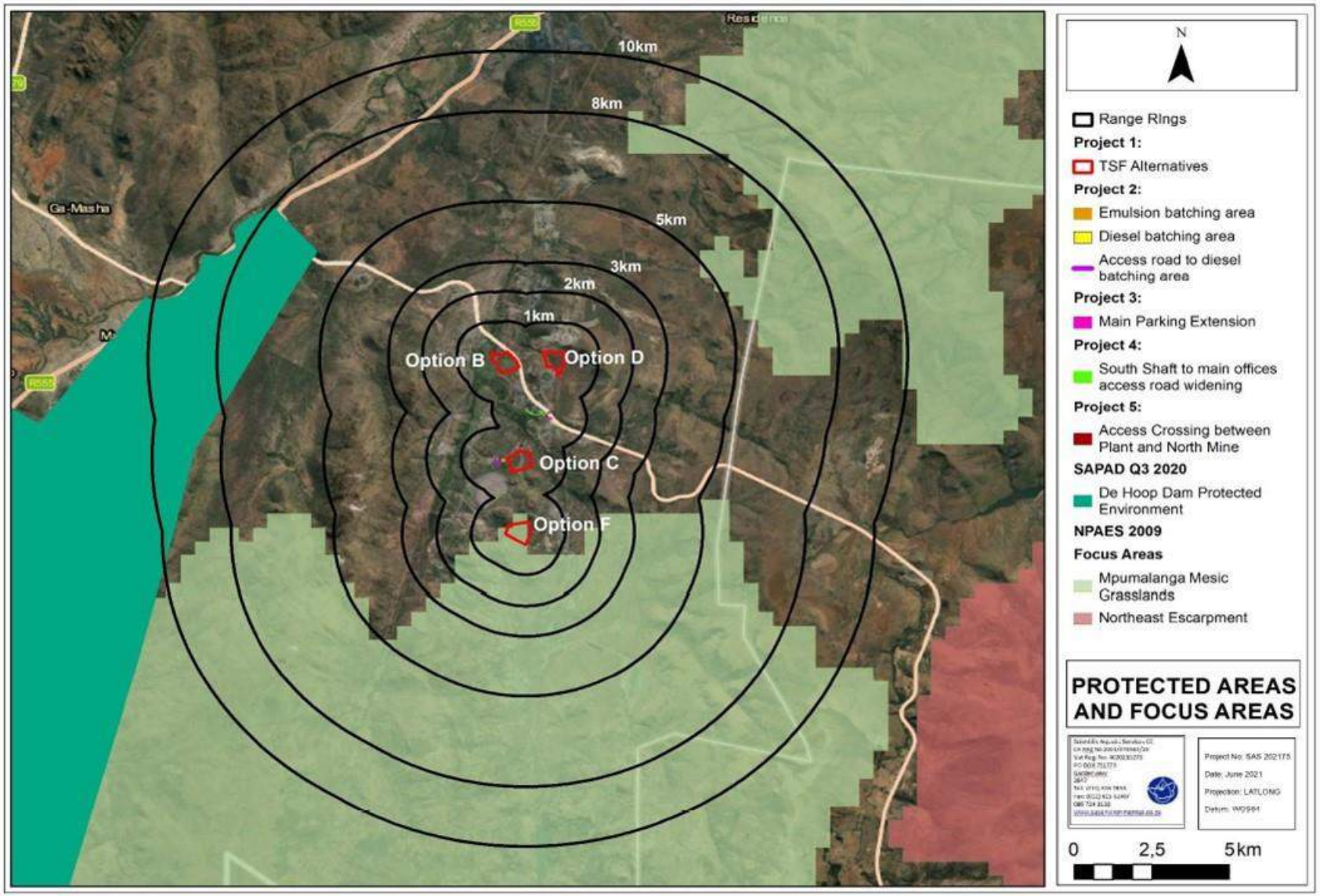


Figure 22: The protected area and focus area associated with the five proposed projects (SAPAD, 2020 and NPAES, 2009)

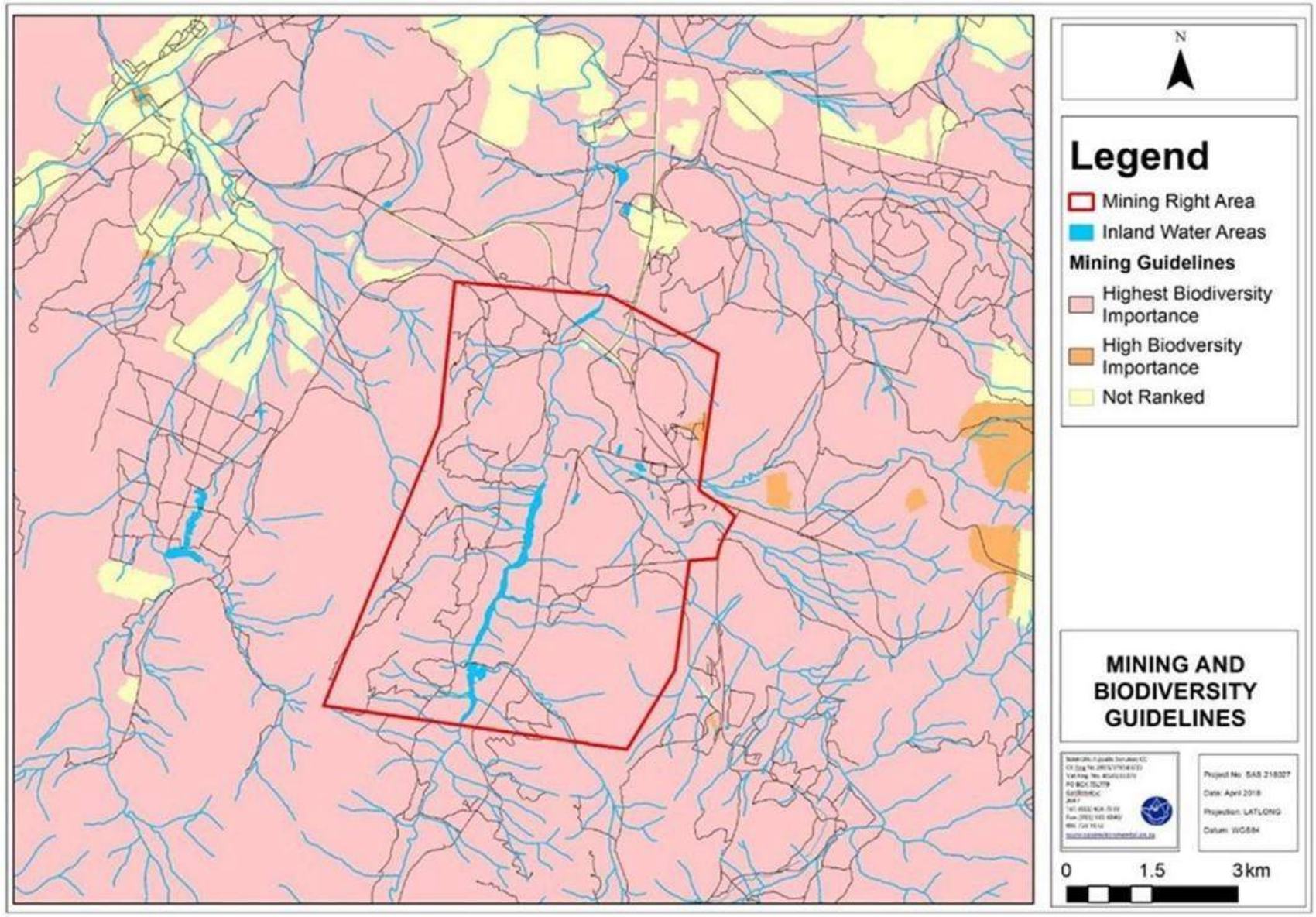


Figure 23: Importance of the MRA according to the Mining and Biodiversity Guidelines (2013)

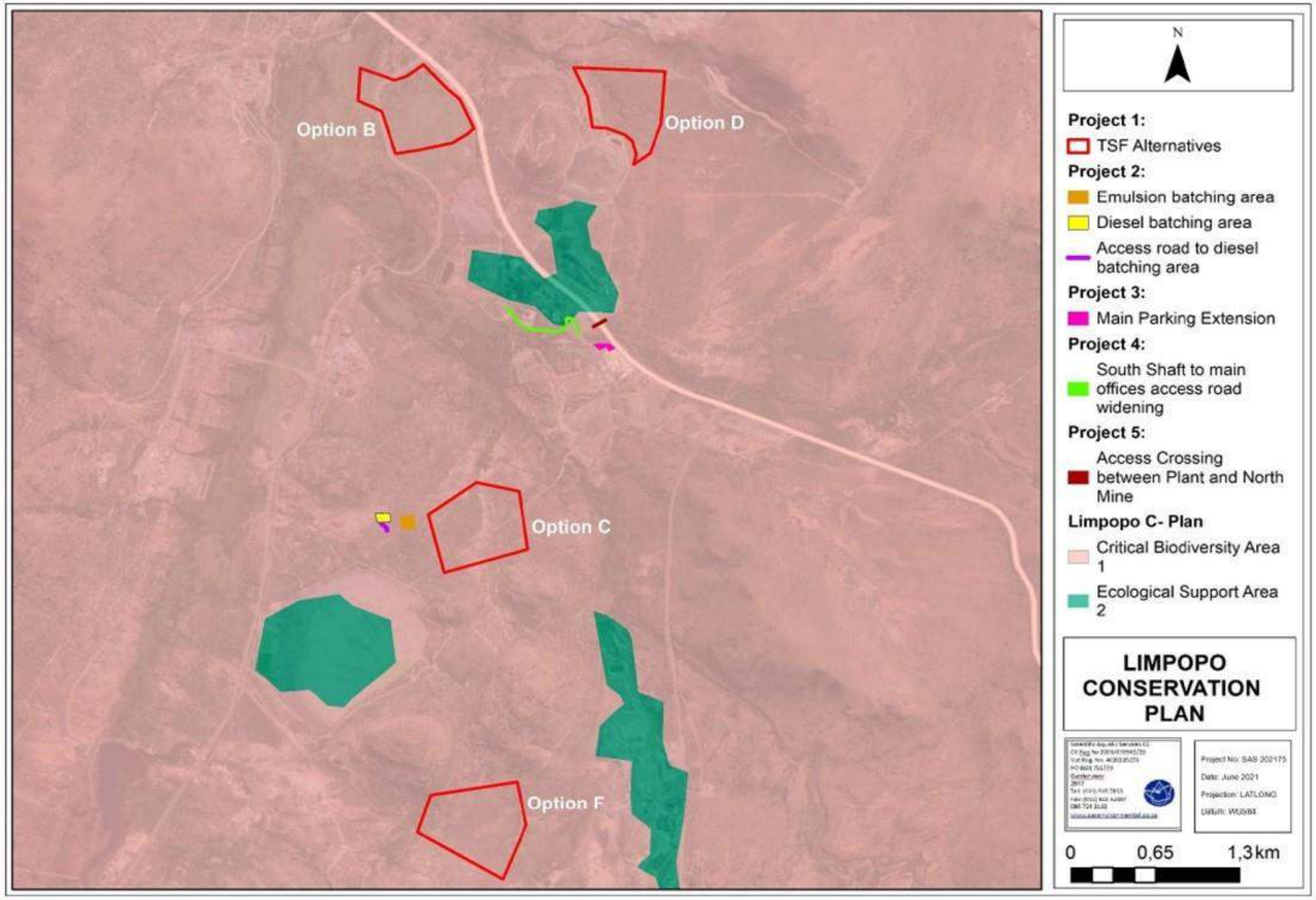


Figure 24: The Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) associated with the project areas according to the Limpopo Conservation Plan database (2013)

1.h.v.1.f Hydrological Setting

Hydrospatial was appointed to undertake the Hydrological Assessment. The water setting information was sourced from this report, as well as available information on site.

Dwarsrivier Mine is located in WMA 4: Olifants, and the greater part of the mine falls within Quaternary Catchment Area B41G (refer to Figure 25). Water drainage on site is in different directions as follows:

- Some water drains toward the Sprinkaanspruit;
- Some water drains to the Klein Dwarsrivier;
- Some water drains toward the Groot Dwarsrivier; and
- Predominant flow direction of natural drainage of water on site is in a western direction.

Site C is located in quaternary catchment B41G, Site D in quaternary catchment B41H, and site B is mostly located in B41G barring a small section of the northern part which is located in B41H.

A number of non-perennial drainage lines drain the mountain ridges and hills within of the Dwarsrivier Mine. These non-perennial drainage lines are ephemeral in nature (only flowing for short periods of time in response to high rainfall) and drain into the Klein Dwarsrivier and Groot Dwarsrivier. The Klein Dwarsrivier flows through the centre of the mine in a north-easterly direction, whilst the Groot Dwarsrivier flows in a north-westerly direction. These two rivers form a confluence near the north of the mine, forming the Dwarsrivier, which flows into the Steelpoort River 8.5km northwest of Dwarsrivier Mine. The Steelpoort River flows into the Olifants River, 40km north-east of the town of Steelpoort. The Olifants River is a tributary of the Limpopo River, which flows into the Indian Ocean near the town of Xai-Xai in Mozambique.

The proposed access road widening, access crossing and main parking extension are located within a 100m horizontal distance of the non-perennial Springkaanspruit, which is a tributary of the Klein Dwarsrivier (Figure 25). The proposed emulsion batching area is located within 100m of a non-perennial drainage line, which drains in a north-easterly direction towards the Groot Dwarsrivier. The diesel batching area drains in a westerly direction towards the Klein Dwarsrivier.

Site B is located on fairly flat topography, dipping gradually in a north-westerly direction towards the Dwarsrivier. According to the 1:50 000 topographical map 2430CC Kennedy's Vale, a non-perennial drainage line occurs along the northern boundary of the TSF site. During the site visit, this area was noted to be disturbed by what appeared to be old stockpiles and borrow pits.

TSF Site C is proposed to be constructed against two hills. The maximum height of the proposed TSF against the hills is 995 mamsl, whilst the lowest elevation is 950 mamsl. This TSF option is drained in a north-easterly direction by two non-perennial drainage lines into the Groot Dwarsrivier.

TSF Site D is located in a valley between two hills and immediately north-east of the mine's active North TSF. TSF Option D reaches a maximum height of 1 810 mamsl along its western side against a hill, whilst its lowest elevation is 934 mamsl. The proposed TSF is drained in a north-westerly direction by a non-perennial drainage line towards the Dwarsrivier. A number of small drainage lines which drain the hill immediately to the east of the proposed TSF are evident. Open pit mining is taking place along this hill as well as to the north-east of the proposed TSF.

Refer to Figure 25 for the freshwater resources associated with the sites.

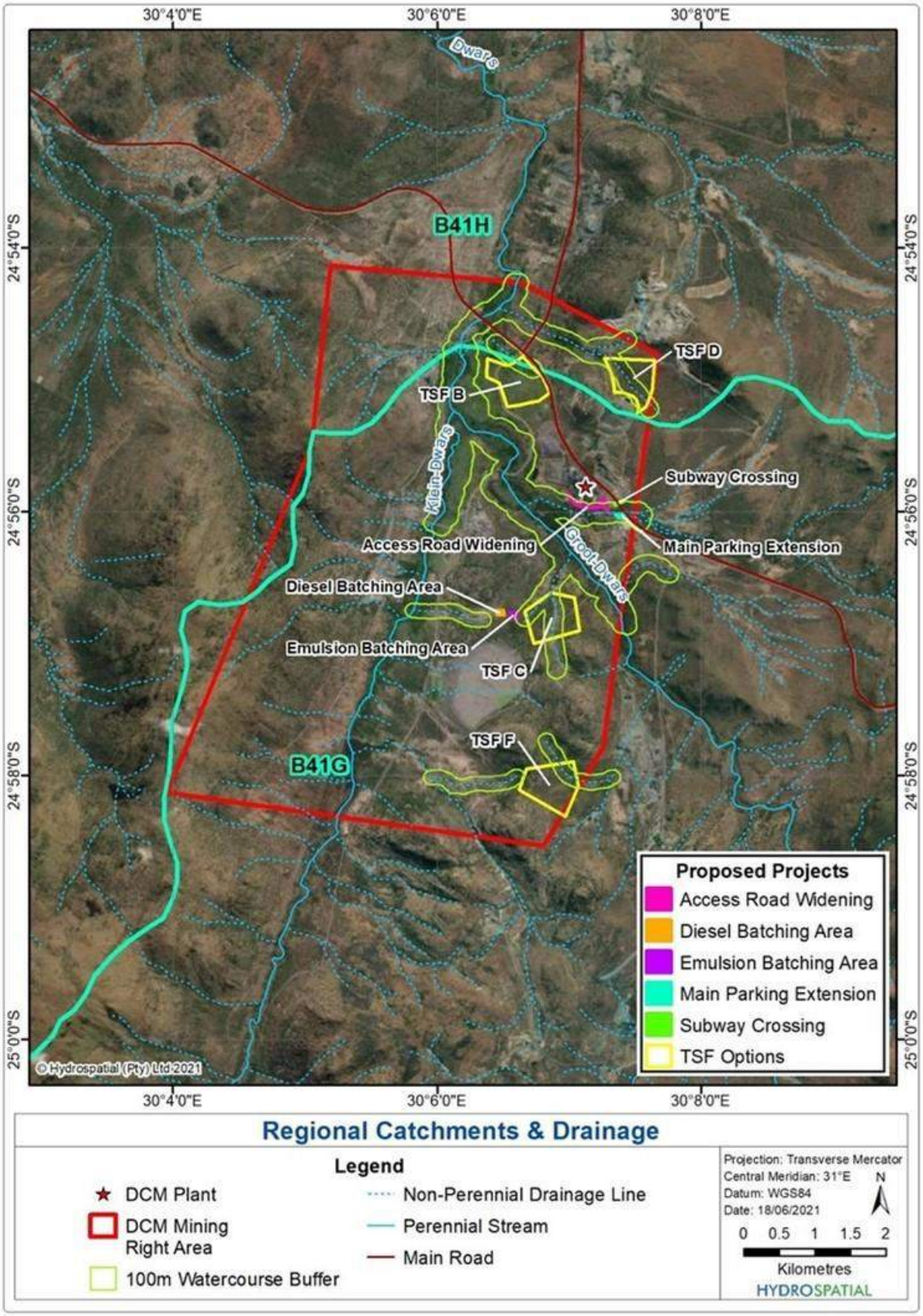


Figure 25: Quaternary Catchments

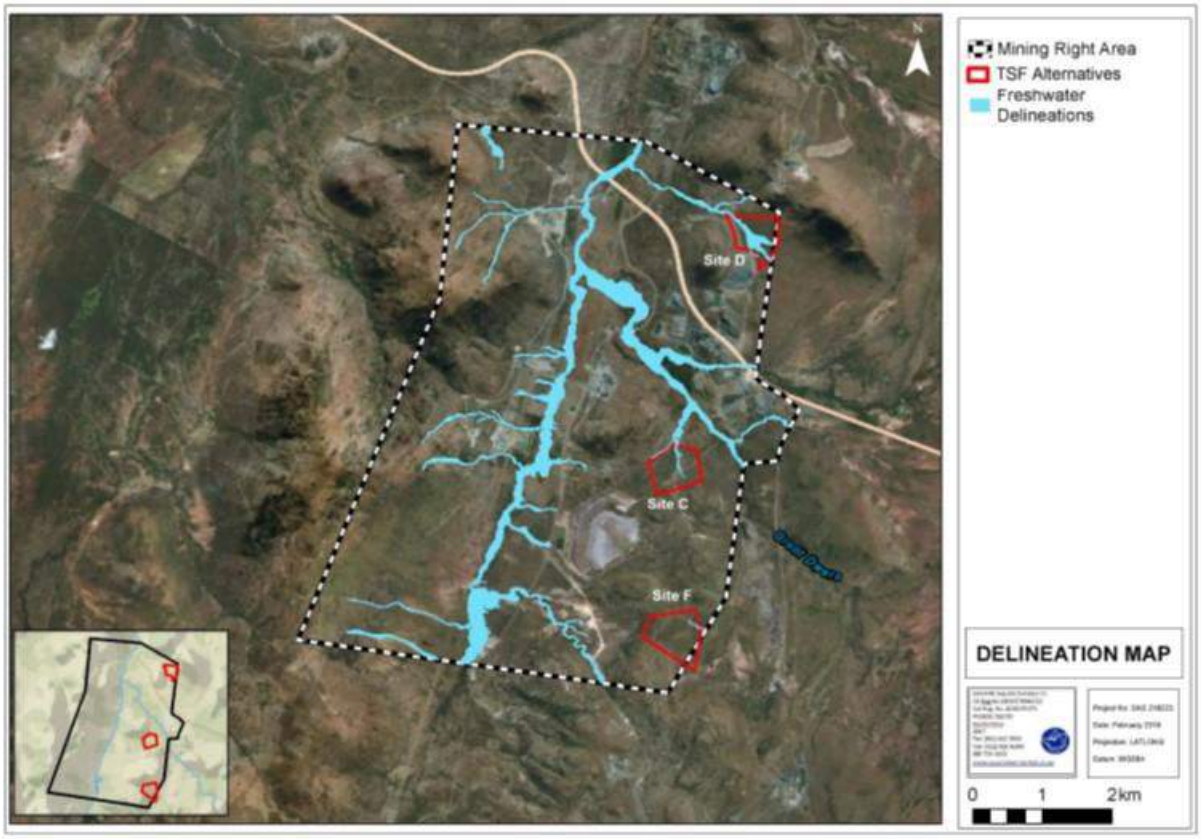


Figure 26: Freshwater Resources

1.h.v.1.g Hydrogeological Setting

iLEH was appointed to undertake the Hydrogeological Assessment The hydrogeological information was sourced from these reports, as well as available information on site.

There are three main aquifers found in the area according to the past hydrogeological studies undertaken for this mine. These include:

- A shallow weathered aquifer present in the upper 20m of the geological succession.
- A fractured rock aquifer consisting of fractured pyroxenites, anorthosites and norites. The depth to weathering in this aquifer varies from 0 – 32m, but is on average 8 – 10m below surface. Pockets of deeper weathering are associated with faulting and/or jointing. The intersection of fractures in exploration boreholes suggests that the majority of fractures occur within the upper 60m of the geological succession. Deeper fracturing is however found to a depth of 200m. Information from monitoring boreholes suggests that water-bearing fractures typically occur to a depth of 40m.
- An alluvial aquifer present in the floodplains of the Groot- and Klein Dwarsrivier. In this aquifer, the lithology varies from large boulders to fine silty material. Monitoring boreholes drilled into this aquifer suggests that it is 20m thick on average.

Dwarsrivier Mine monitors 17 boreholes around the operations, of which 16 are stated in the WULs. The boreholes are indicated on the following figure.

Groundwater is used as water supply to the operations. Groundwater is abstracted from six boreholes. Their locations are indicated on the following figure. Past and current groundwater abstraction patterns are summarised in the following table. This information represents average volumes from the mine's monitoring database.

Table 22: Groundwater abstraction volumes

Boreholes	2016 Average abstraction volume (m^3/d)	Long-term average abstraction volume (m^3/d)
BHD1	149	113
BHD2	0	82
BHE	143	107

Boreholes	2016 Average abstraction volume (m^3/d)	Long-term average abstraction volume (m^3/d)
BHA+B to tank	118	139
BHA+B to MRC	110	291

Extraneous mine water is pumped via a series of underground dams from both the South and North Pit Portals. This water is pumped to the Clarifier and then channelled to Dam 26 for re-use in the mine water circuit. The dewatering volume declined since monitoring thereof started in 2008.

The following site specific considerations in terms of the TSFs must be considered in terms of groundwater:

- Site B: The underlying lithology at this site is alluvium associated with the Dwarsrivier and Groot Dwarsrivier , which creates a major regional aquifer. Dwarsrivier Mine currently abstracts groundwater from this aquifer from BH D1 and D2, situated 725m southwest from Site B. Site B is not currently undermined, but future underground mining is planned for this area. Site B is furthermore underlain by both a fault and a dyke. These structures may act as preferential flow paths to groundwater. Dwarsrivier Mine is in the process of drilling and testing monitoring boreholes that target the dyke and fault present in order to quantify the extent to which these structures could act as preferential flow paths. The provisional results from the drilling and testing programme suggests that strong aquifers are associated with these geological structures with potential high yields. This was identified as a potential risk, as detailed above. The site is situated within an existing watercourse associated with the alluvial aquifers, which suggests that shallow groundwater conditions may occur during the wet season. The site is also situated on or near the alluvial aquifer associated with the Klein- and Groot Dwarsrivier. This must be confirmed should this site be developed further. Groundwater in this area has already been impacted by the historical TSF, the Plant and the discard dump. The TDS and NO_3 concentrations in the nearest borehole (DRM3) confirm the poorest groundwater quality conditions for the four sites evaluated. The depth to groundwater at this site is the shallowest of all the sites evaluated (4.53m), which means that the barrier between the TSF and the aquifer is the smallest for all four sites. It is not thought that groundwater levels would rise to surface and thus into the liner system. The shallow groundwater is however flagged as a potential risk. Groundwater is not used in the immediate vicinity of Site B other than being monitored.
- Site C: This site is underlain by alluvium that forms part of the regional alluvial aquifer associated with the main rivers in the area, as for Site B. Site C is situated south of the Dwarsrivier Mine mining surface infrastructure, but is underlain by the existing underground workings at South Shaft. South Pit is situated 550m northeast of the site. The existing Two Rivers Platinum (TRP) TSF is situated approximately 150m southwest of this site. The site overlies a fault identified by GAP (2018), but the nearest dyke is 120m to the east. The footprint is located within an existing watercourse that drains towards the Groot Dwars River. The depth to groundwater in the nearest borehole (DRM6) is 9,03m, which creates a larger barrier between the TSF and the underlying groundwater table compared to Site B. Groundwater quality in this area has also been impacted on, especially in terms of NO3 concentrations, but not to the same extent as at Site B. Groundwater is not used at this site other than for monitoring and the nearest groundwater abstraction boreholes (BH D1 and D2) are situated 1270m to the northwest.
- Site D: The site is situated immediately north of the existing Northern TSF. The regional geological map suggests that the footprint is situated partly on alluvium and partly on norite/anorthosite. Groundwater in this area has already been impacted on by historical opencast mining, waste rock dumps and possibly by the northern TSF. It is noted that the latter has an HDPE liner installed. This footprint is partially underlain by an old backfilled and rehabilitated opencast pit. It is however noted that the Northern TSF also overlies an old pit, which suggests that this situation can be overcome through implementation of the appropriate engineering solutions. This site is not underlain by the faults or dykes identified by GAP (2018). The site is situated in an existing watercourse, with surface water draining in a northeasterly direction towards the Dwars River. The depth to groundwater in borehole ASDWBH2, situated within the designated footprint area, is however 16,12m, which is the deepest groundwater table condition for the four sites evaluated. Groundwater quality is already impacted in this area, most notably in terms of NO3 concentrations. The nearest Dwarsrivier Mine boreholes used for groundwater abstraction in this area are situated 1690m southwest of the site.

Please refer to Figure 15 and Figure 16.

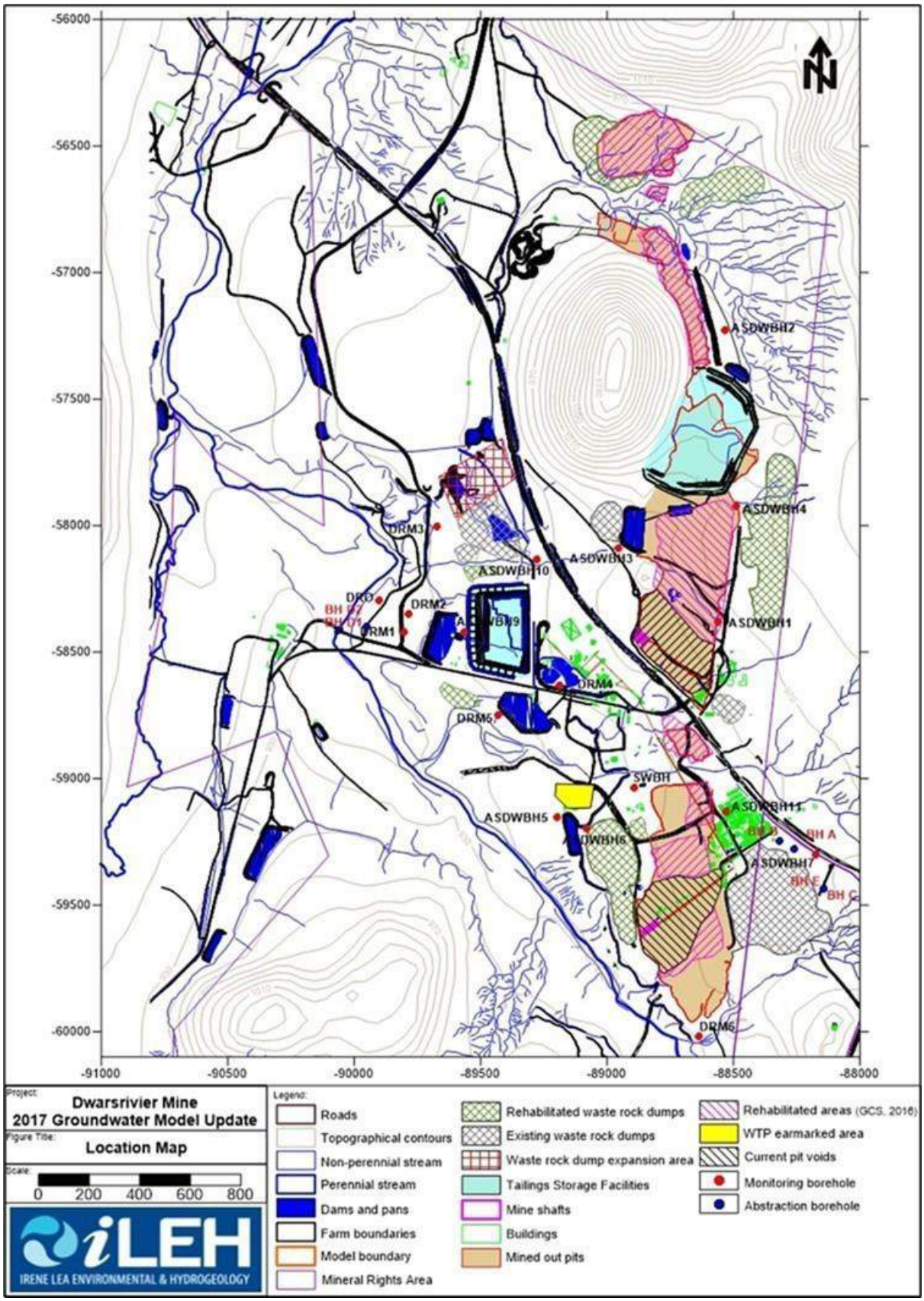


Figure 27: Groundwater Monitoring Points

From a groundwater perspective, the following are considered risks:

- The presence of the alluvial aquifer associated with the Klein- and Groot Dwarsrivier relative to the TSF footprint area. This aquifer is formed by unconsolidated alluvium and is unconfined. It is therefore

vulnerable to the impact of surface sources of potential contamination, like that associated with the proposed Khulu TSF.

- The presence of a preferential flow path with high permeability near or under the footprint of the proposed TSF. Such flow paths may be associated with faults and dykes, such as those identified by GAP (2018). It is noted that the current monitoring borehole drilling and aquifer testing underway as part of the Khulu TSF project is geared at characterising the perceived preferential flow paths to groundwater.
- It is noted that the current monitoring borehole drilling and aquifer testing underway as part of the Khulu TSF project is geared at characterising the perceived preferential flow paths to groundwater. Provisional results obtained for aquifers present underneath the Site B footprint suggest that the faults and dyke that underly this area are potentially strong aquifers with high groundwater yields. This risk is highlighted based on preliminary results from groundwater monitoring borehole drilling and aquifer testing. A more detailed assessment will be provided in the EIA Phase report, once this fieldwork has been completed. However, the presence of potentially strong aquifers underneath the Site B footprint is identified as a potential risk.

It is noted that both risks listed above can be mitigated through selection and implementation of a suitable barrier system (liner) over the TSF footprint. The impact of liner failure, leakage through the liner or poor liner installation will however result in a higher risk to groundwater in the presence of the alluvial aquifer or a preferential flow path with high permeability.

1.h.v.1.h Sensitive Sites or Wetlands

SAS was appointed to undertake the Wetland Assessment. The wetland and aquatic habitat setting information was sourced from this report, as well as information available on site.

The five proposed projects fall within an area considered to be of Highest Biodiversity Importance. Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g. water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive the necessary authorisations.

Projects 2 to 5 and TSF Site C and the majority of TSF Site B fall within an area defined as a Freshwater Ecosystem Priority Area (FEPA) catchment, with the remaining northern portion of TSF Site B and the entire Site D located within an area considered a Fish Support Area (FSA). River FEPAs achieve biodiversity targets for river ecosystems and threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, the surrounding land and smaller stream network needs to be managed in a way that maintains the good condition of the river reach. Remaining fish sanctuaries in lower than an A or B ecological condition were identified as Fish Support Areas. Furthermore, the Fish Support Areas include sub-quaternary catchments important for migration of threatened fish species (Figure 28).

In terms of the NFEPA Wetlands:

- Within TSF Sites C, and D, a single watercourse was identified, mapped and characterised. No watercourses were identified directly within Site B, the proposed batching areas, main parking extension, access road proposed to be widened and the new crossing proposed between North Mine and the Plant, although watercourses were identified within 500m of each project. Although no watercourses are directly associated with the remaining projects (i.e. not situated directly within the proposed project areas), the proposed batching areas are located upgradient of watercourses, and the proposed extension of the Main Parking area will encroach marginally on the delineated riparian zone of the Springkaanspruit.
- No wetlands or rivers are indicated by the NFEPA database within any of the five proposed projects (Figure 29).
- The database indicates three small artificial unchanneled valley bottom wetlands located within the investigation area of the proposed project 4. These wetlands are considered to be heavily to critically modified (Class Z3). Analysis of digital satellite imagery indicates that these are various mine process water dams.
- The Dwarsrivier is located within the western portion of TSF Site B's investigation area. The river is a designated FSA and is currently in a moderately modified ecological condition (Class C).

- The Groot-Dwars River traverses the south-western portion of Site B's investigation area and the north eastern portion of Site C's investigation area. This river is considered largely natural (Class B) and is a designated FEPA River (Figure 32 and Figure 33).

The five proposed projects fall within the Central Bushveld Group 1 Wetland Vegetation Type, considered Critically Endangered (CR) (Mbona et al, 2015).

According to the National Biodiversity Assessment (NBA; 2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) the artificial features identified by the NFEPA Database (2011) to be located within the investigation area, are classified as dams. The Dwarsrivier and Groot Dwarsrivier are largely modified according to the NBA 2018 dataset. The Ecosystem Protection Level (EPL) of the rivers are poorly protected and therefore the rivers are Critically Endangered (Ecosystem Threat Status (ETS)).

For the aquatic biodiversity theme, the five proposed projects, with the exception of a portion of Site B and the entire Site D, are considered to have an overall very high aquatic sensitivity, due to the area being classified as a FEPA catchment (NFEPA, 2011). The remaining northern portion of Site B and the entire Site D have a low aquatic sensitivity.

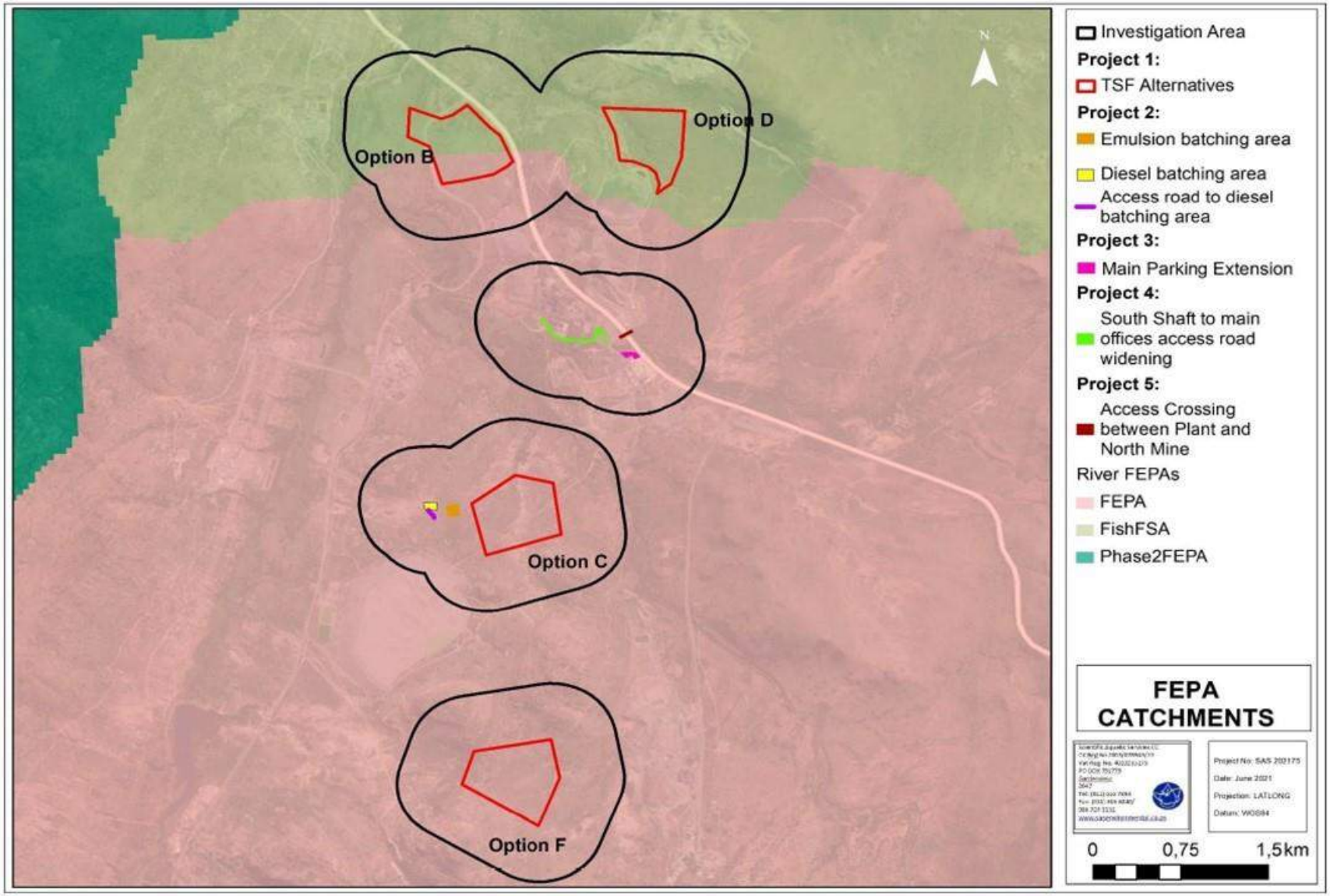


Figure 28: The wetland features identified as FEPA wetlands, according to the NFEPA Database (NFEPA, 2011).

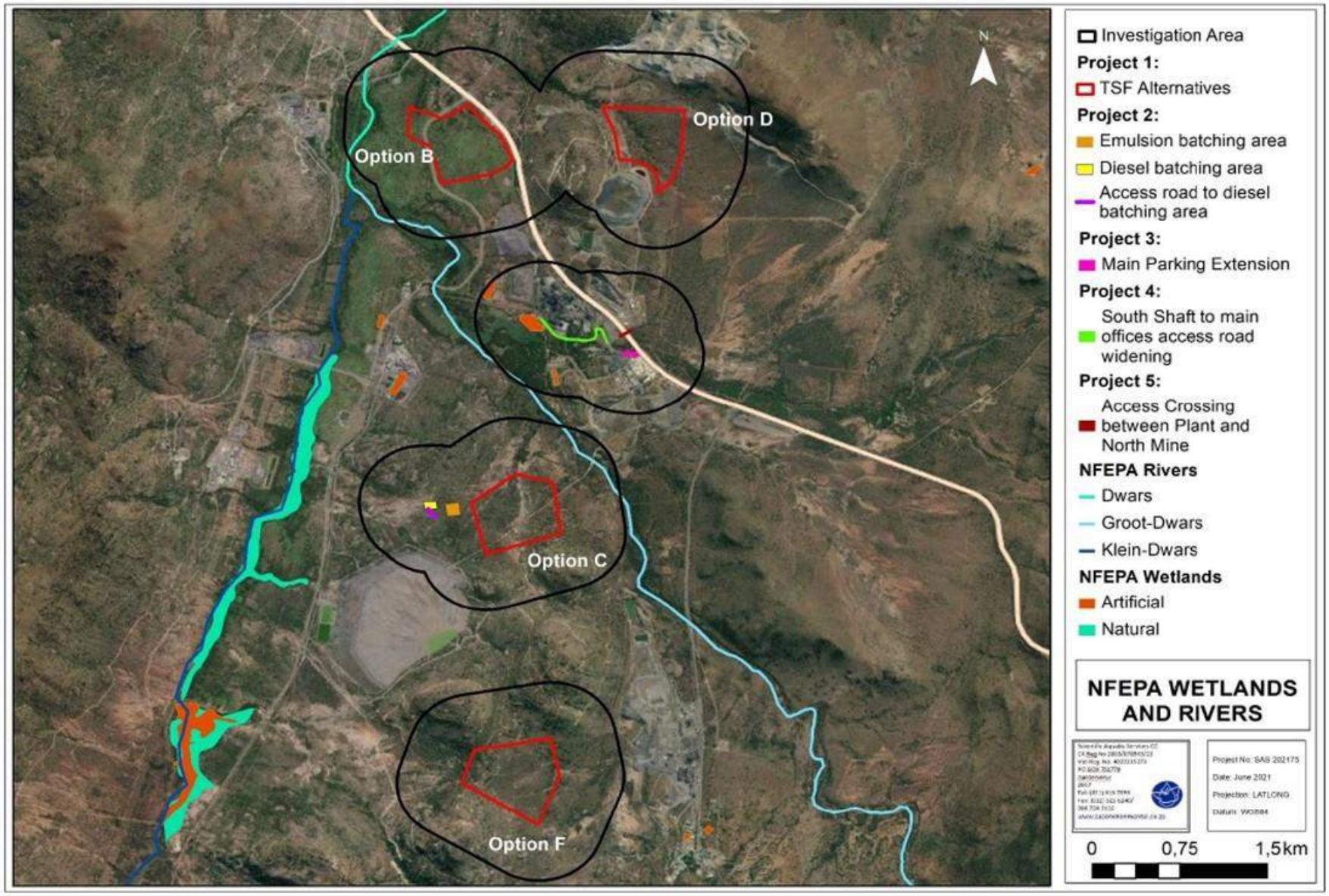


Figure 29: The natural and artificial wetland features, and rivers associated with the TSF site alternatives according to the NFEPA Database (NFEPA, 2011)

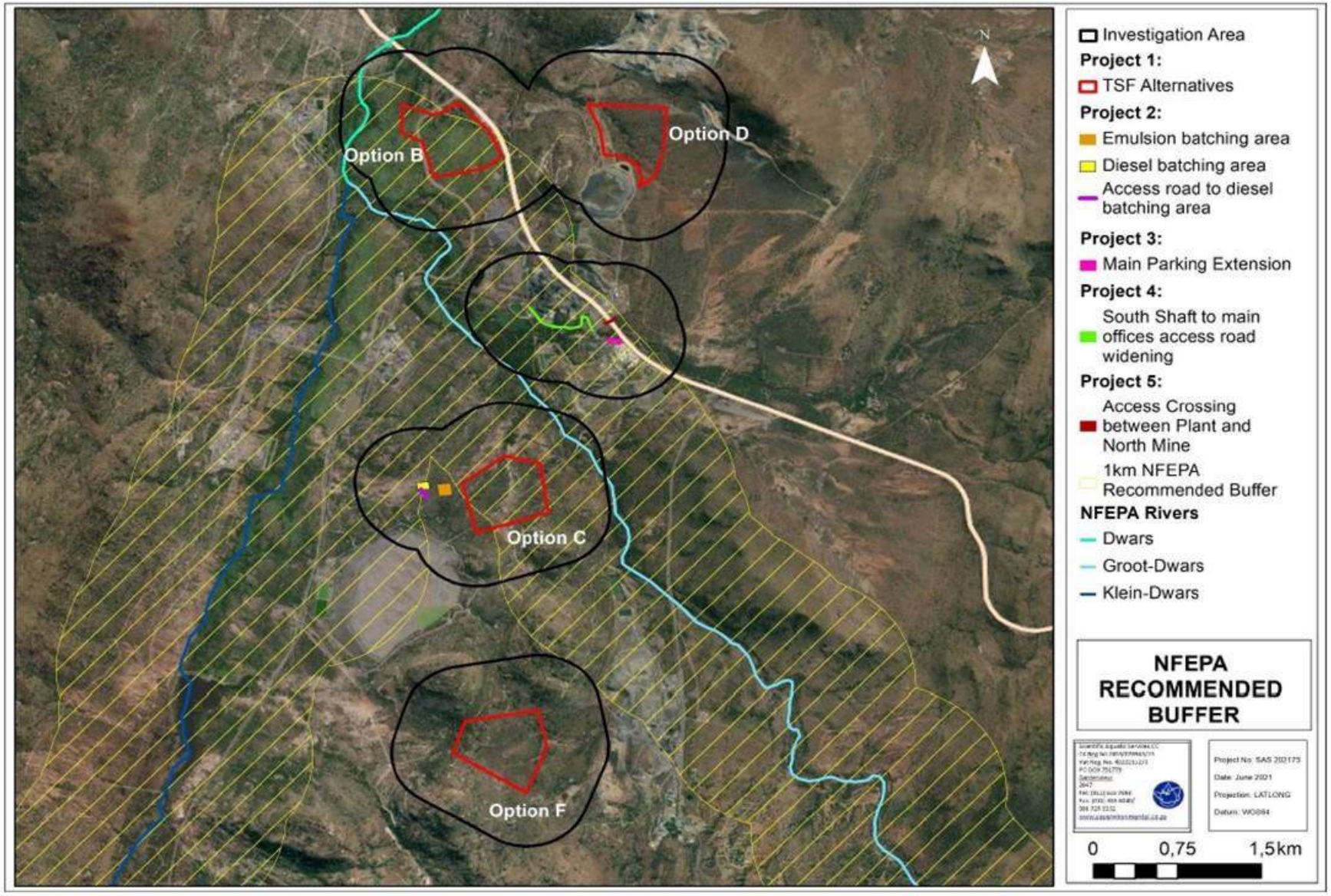


Figure 30: The 1 km recommended buffer around the FEPA Rivers, according to the NFEPA Database (2011)

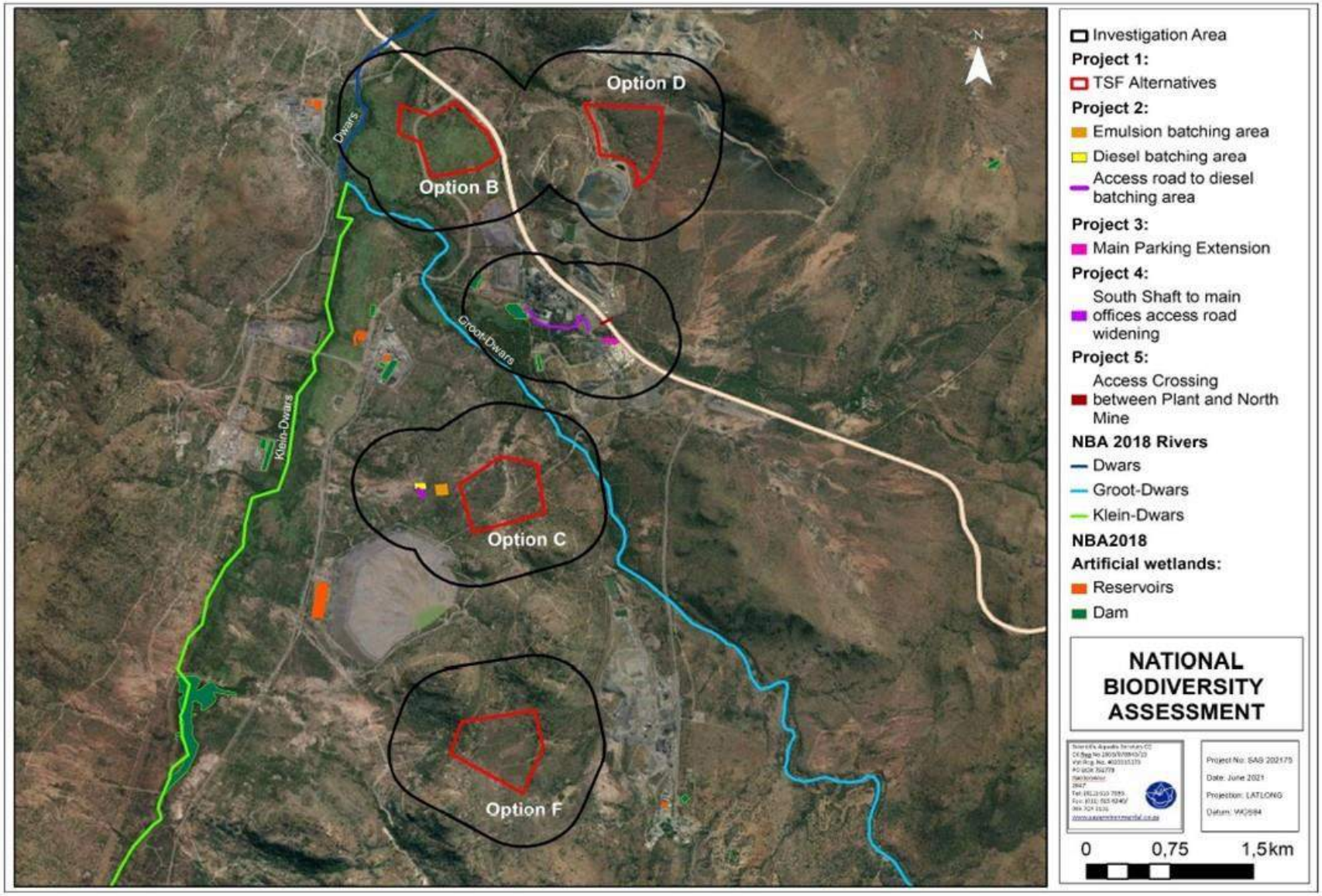


Figure 31: Artificial wetlands associated with the five proposed projects according to the National Biodiversity Assessment (NBA) (2018)

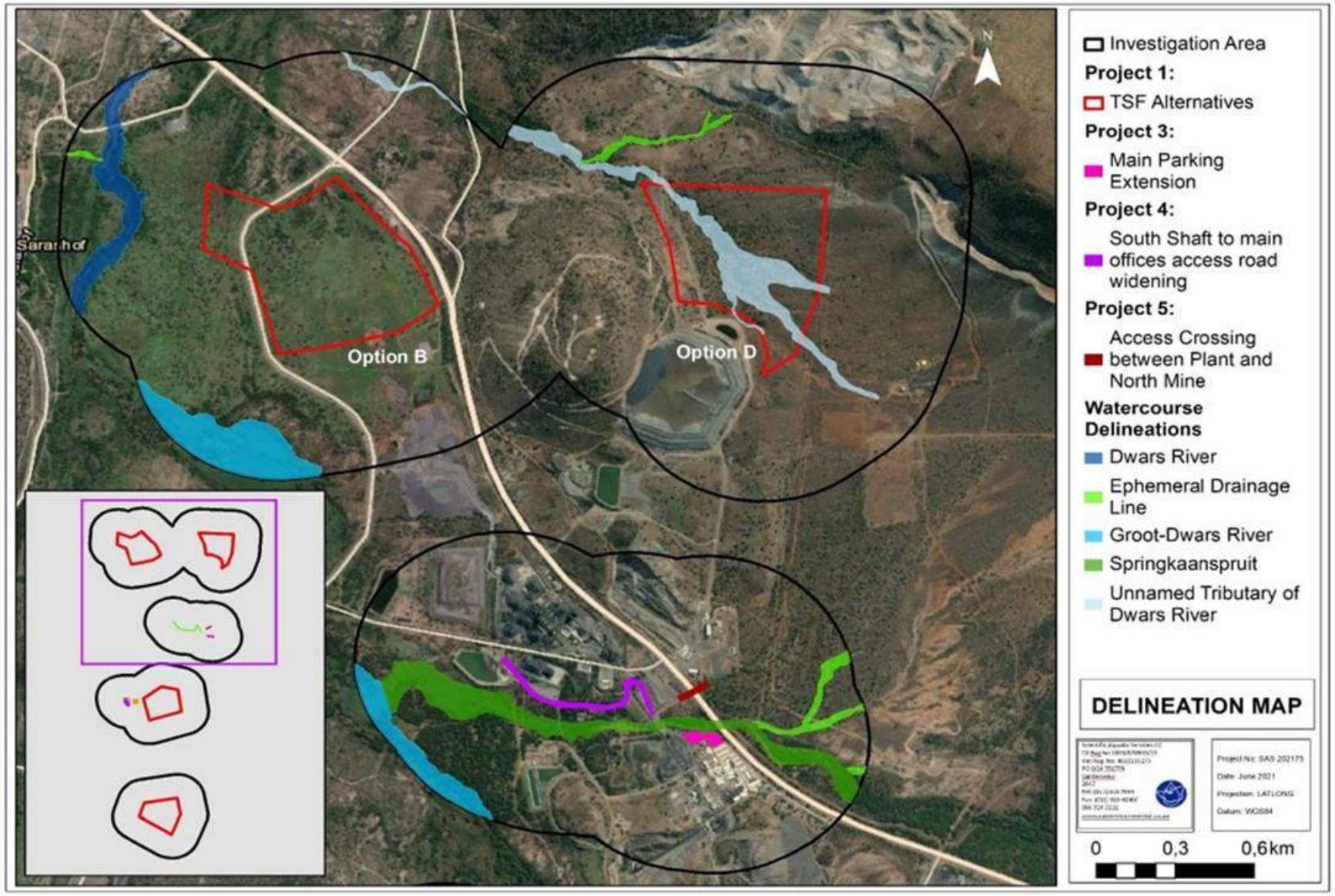


Figure 32: Identified watercourses within the vicinity of Projects 1,3, 4 and 5

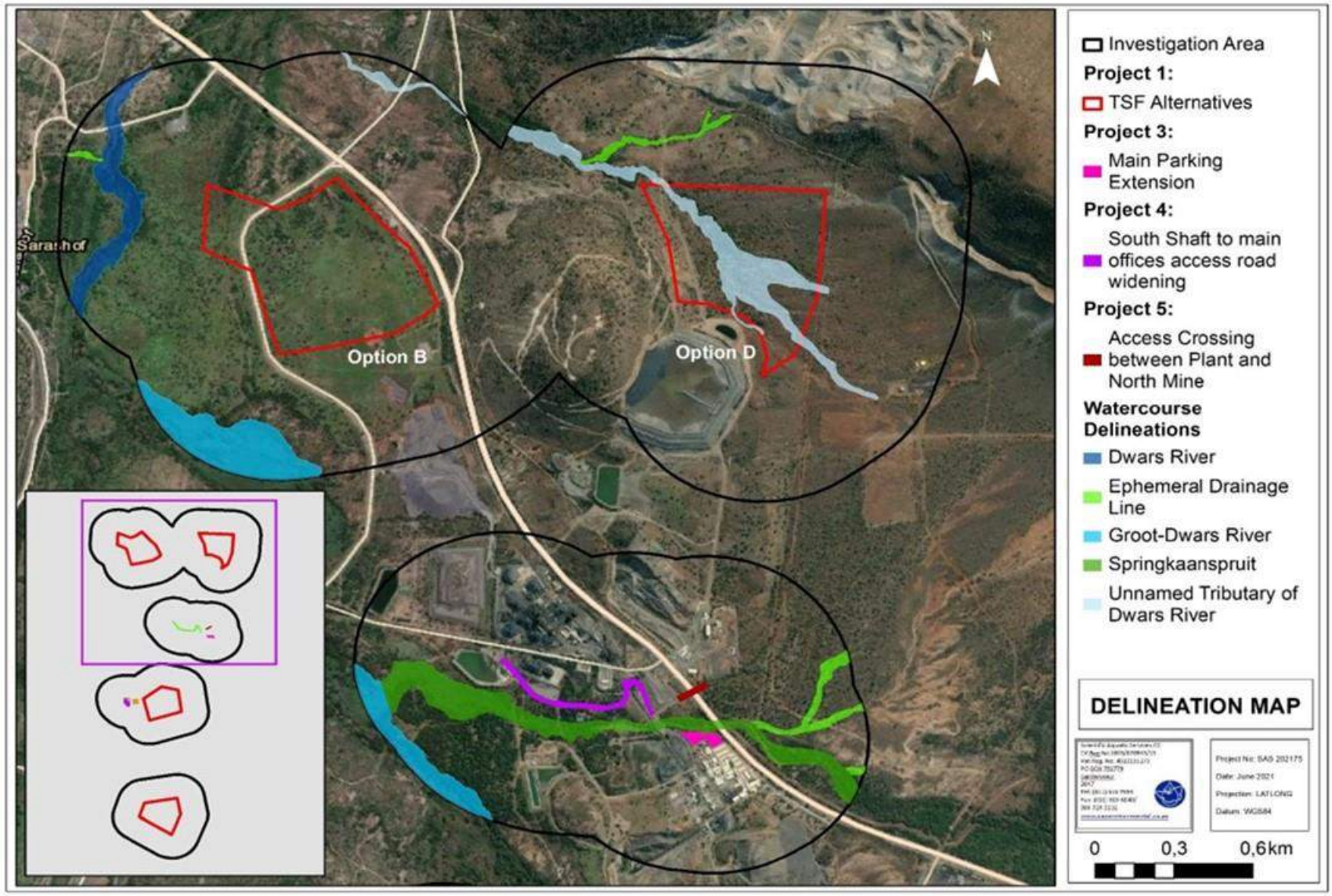


Figure 33: Identified watercourses within the vicinity of Projects 1 and 2

1.h.v.1.i Visual Character

Hydrospatial was appointed to undertake the Visual Assessment. The visual setting information was sourced from this report.

Within a 5km radius of the TSF options, the region can be broadly divided into the following categories:

- Mining areas – mining areas occur mostly along the valleys of the Groot- and Klein Dwarsrivier; and
- Natural bushveld areas.

The sense of place can be defined as the character of the place, whether natural, rural or urban, and is largely dependent on the visual and landscape characterisation of an area.

Mining dominates the landscape, with a number of mines occurring in the region. The natural bushveld sense of place, has largely been converted into a mining landscape.

1.h.v.1.j Air Quality

WSP Consulting was appointed to undertake the Air Quality Assessment. The air quality setting information was sourced from this report, as well as information available on site.

Possible emissions sources identified in the Dwarsrivier area that contribute towards the air quality status quo include mining, agriculture and vehicle tailpipe emissions along nearby roads.

Mining and Agricultural Activities

Mining is the predominant land use within the surrounding area, with existing and operational chrome and platinum mines in the surrounding area. Expected fugitive emissions from mining include wind erosion and material handling.

Additionally, agriculture is also one of the dominant land uses within the surrounding area, comprising mostly in the form of stock grazing and the production of vegetables, lucerne and cotton.

Emissions from agricultural activities are difficult to control due to the seasonality of emissions and the large surface area producing emissions (USEPA, 1995). Expected emissions resulting from agricultural activities include particulates associated with wind erosion, ploughing and burning of crop residue, chemicals associated with crop spraying and odiferous emissions resulting from manure, fertilizer and crop residue.

Dust associated with agricultural practices may contain seeds, pollen and plant tissue, as well as agrochemicals, such as pesticides. The application of pesticides during temperature inversions increases the drift of the spray and the area of impact. Dust entrainment from vehicles travelling on gravel roads may also cause increased particulates in an area. Dust from traffic on gravel roads increases with higher vehicle speeds, more vehicles and lower moisture conditions.

These are the most likely contributors of fugitive emissions from agricultural activities. However, it is noted that fugitive emissions from agricultural activities generally have confined impacts near to the source, limiting the regional impacts.

Vehicle Tailpipe Emissions

Atmospheric pollutants emitted from vehicles include hydrocarbons, CO, CO_2, NO_x, SO_2 and particulates. These pollutants are emitted from the tailpipe, from the engine and fuel supply system, and from brake linings, clutch plates and tyres. Hydrocarbon emissions, such as benzene, result from the incomplete combustion of fuel molecules in the engine. Carbon monoxide is a product of incomplete combustion and occurs when carbon in the fuel is only partially oxidized to carbon dioxide. Nitrogen oxides are formed by the reaction of nitrogen and oxygen under high pressure and temperature conditions in the engine. Sulphur dioxide is emitted due to the high sulphur content of the fuel. Particulates, such as lead, originate from the combustion process as well as from brake and clutch linings wear (Samaras and Sorensen, 1999).

Possible contributors to mobile combustion emissions include access roads surrounding the site. Neighbouring communities are likely to use these routes on a daily basis to access the mine.

Five monitoring points are assessed for dust fallout by the mine. These are indicated in the following table:

Table 23: Dust Monitoring Points

Sample Point	Sample Point Name
DWR 001	School
DWR 002	Far North Point
DWR 003	Parking Lot South Shaft
DWR 004	Discard Dump South Shaft
DWR 005	North Shaft

The following figure illustrates the location of these.

Figure 34: Dust Monitoring Locations

As mentioned before, there are five Dust Watch units installed and operational at the Dwarsrivier Mine, namely the DWR 001 unit, DWR 002 unit, DWR 003 unit, DWR 004 unit, and the DWR 005 unit.

The fall-out dust standards from National Dust Control Regulations, 2013.

Based on the monitoring results available the dust fall out remains within the standards of 1 200 mg/m^2/day.

Sensitive receptors (i.e. places where sensitive individuals may be impacted, such as residences, schools and medical facilities) within a 10km radius of the study site that have been selected for evaluation in this impact assessment are listed in the following table:

Table 24: Sensitive Receptors

ID	Receptor Name	Distance from Site B (km)	Distance from Site C (km)	Distance from Site D (km)	Longitude (°S)	Latitude (°E)
1	SR1 (Villages)	6.01	3.05	5.91	30.127585	24.973693
2	SR2 (Villages)	5.06	8.17	5.10	30.119396	24.869117

Figure 35: Proposed TSF site locations and sensitive receptors within 10km radius

1.h.v.1.k Noise

A noise impact assessment was conducted by dBAcoustics in May 2009 and this revealed the following sources of noise along the boundaries of the mine:

- traffic noise – both light motor vehicles and heavy-duty trucks;
- distant mine noise;
- mine activity noise;
- industrial noise; and
- ventilation noise.

No additional noise assessment was undertaken for the current application as the activities in question are located within the existing mining footprint and will be a pure expansion of existing facilities.

Of particular significance is the presence of the R577 regional road from Sekhukhune land to Lydenburg that transects the mine property and is adjacent to the main mining activities on Dwarsrivier Mine, most importantly the processing plant, conveyor and workshops. Also important is the presence of four other mining operations in the vicinity of Dwarsrivier Mine.

These contribute noise directly to the ambient noise levels, but also indirectly through the presence of heavy duty and other traffic on the R577 and minor access roads to the mines. The area cannot be classified as rural according to Table 2 of SANS 10103 due to the above factors.

The following conclusions were drawn from the results of the noise impact assessment:

- The prevailing ambient noise levels along the boundary of the mining area are lower than the recommended noise level for an industrial area;
- The prevailing ambient noise levels are largely caused by emissions from a combination of noise sources;
- The significance of the noise impact from the activities at the proposed mine on the existing immediate environment will be medium according to the standardised risk matrix; and

- According to Table 5 of SANS 10103 of 2008, the community response to the industrial type noise will be medium due to the higher prevailing ambient noise levels already experienced in this area from other mining activities.

1.h.v.1.l Cultural and Heritage Setting

Heritage Contracts and Archaeological Consulting (HCAC) was appointed to undertake the Heritage and Paleontological Assessment The information was sourced from these reports, as well as available information on site.

This brief background study indicates that the general area under investigation has a wealth of heritage sites and a cultural layering dating to the following periods:

- Stone age sites;
- Iron Age sites and;
- Graves can be expected anywhere on the landscape.

Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases.

Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2012). The three main phases can be divided as follows:

- Later Stone Age: associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago
- Middle Stone Age: associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age: associated with early Homo groups such as Homo habilis and Homo erectus. 400 000- > 2 million years ago. 7.2.1.2 The Iron Age

Middle Stone Age isolated artefacts are found scattered over the landscape. Finds typically include radial cores, triangular points and flakes. These artefacts are scattered too sparsely to be of any significance (Van der Walt 2016).

The Iron Age

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. Most of the decorated pottery found in the study area belongs to the stylistic facies known as Eiland. This style dates to between 1550 AD and 1750 AD and was made by Sotho-Tswana people (Huffman 2007: 186-189). These Middle Iron Age Sites do not have any stone walling associated with them and is found close to cultivatable soil. Some stylistic Marateng pottery were also recorded presumably in association with Late Iron Age stone walled settlements. Marateng pottery dates to between 1650 AD and 1840 AD (Huffman 2007: 207).

Historical Information of the area

European occupation began in 1845 when trekkers established Ohrigstad and then Lydenburg a few years later. Originally, the trekkers were interested in ivory, but they also needed land and labour for agriculture. Tensions with African communities over these needs rose to such a point that the Trekkers attacked the Pedi capital in 1852. They failed, however, to destroy Pedi authority. Somewhat later, they negotiated a peace with Sekwati and traded cattle for land. Boers then started to establish farms in the region. GS Maree, for example, settled on

Mareesburg in 1871. Tensions over land and labour increased again until the ZAR attacked the Pedi capital in 1876: this battle also failed to break Pedi resistance.

This brief historical outline helps to date some other sites in the study area. In particular, a number of settlements located around high meadows probably date from 1860 to 1880, when tensions were high but before major European occupation of local farms.

Anglo-Boer War

The Anglo-Boer War was the greatest conflict that had taken place in South Africa up to date. No sites relating to the war are known to occur in the study area.

Known Sites

Based on the desktop study a number of known sites were identified and mapped in relation to the proposed sites. None of the previously known sites occur within the proposed site alternatives (see the following figure).

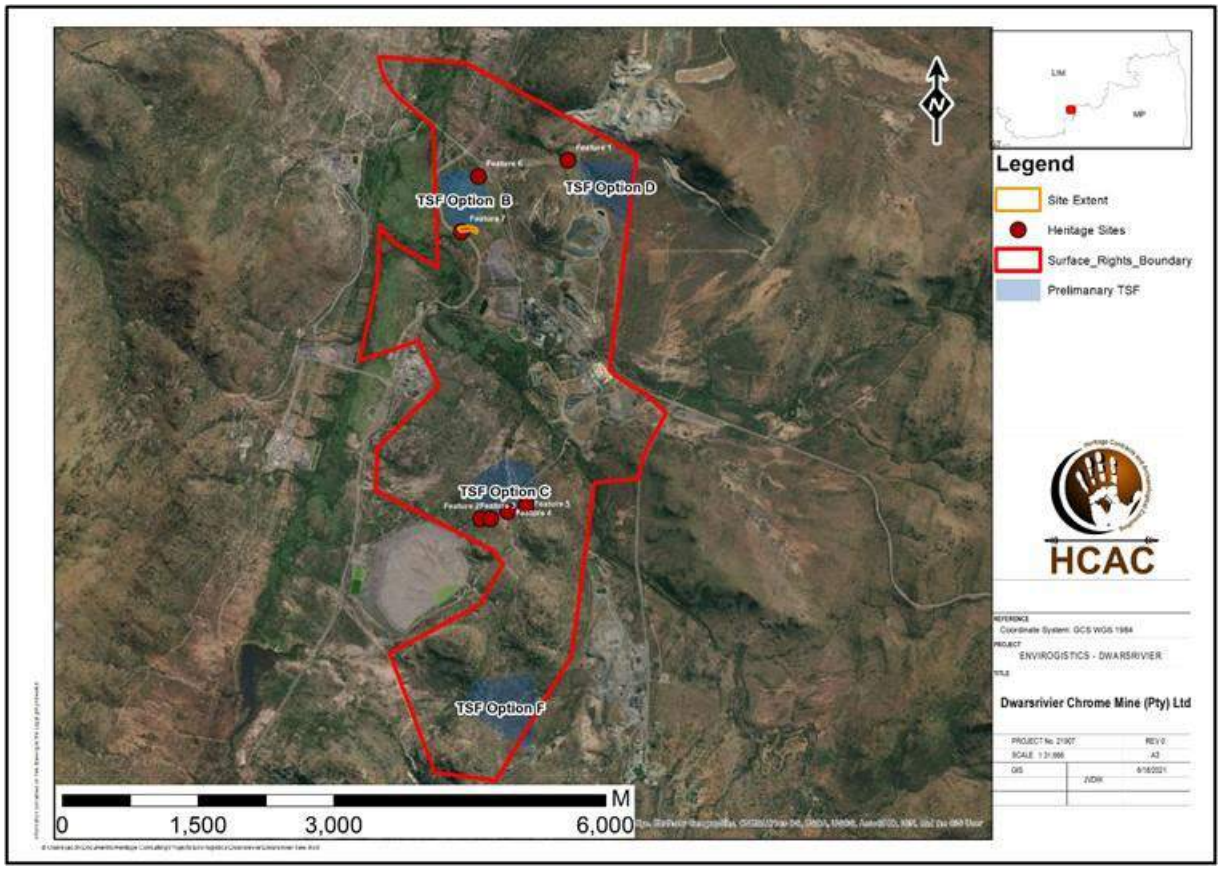
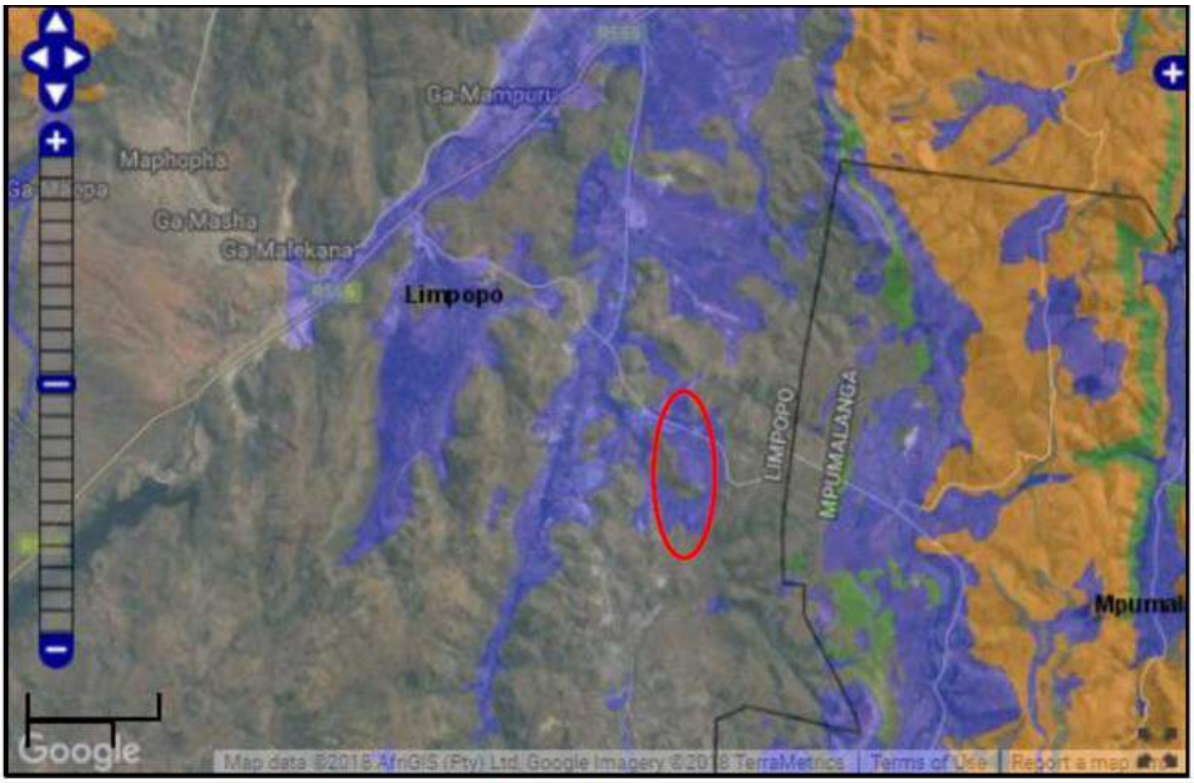


Figure 36: Known sites in relation to the study area.

Paleontological Sensitivities

The area is indicated as of insignificant and low paleontological sensitivity on the SAHRA paleontological sensitivity map (see the following figure



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

Figure 37: Paleontological Sensitivity

1.h.v.1.m Socio-Economic Setting

BathoEarth was appointed to undertake the Socio-Economic Assessment. The socio-economic setting information was sourced from these reports, as well as those of the available information on site.

General Setting

The Sekhukhune District Municipality (SDM) was established in December 2000. It consists of four Local Municipalities, namely Elias Motsoaledi, Ephraim Mogale, Fetakgomo-Tubatse, and Makhuduthamaga Local Municipalities. The district is situated in the Limpopo province, to the northwest of Mpumalanga and within the southern section of the Limpopo Province. The SDM covers an area of approximately 13 264 m^2. Most of the area is typical rural as only 5% of Sekhukhune population lives in urban areas.

The main urban centres are Groblersdal, Marble Hall, Burgersfort, Jan furse, Ohrigstad, Steelpoort and Driekop. Outside these major towns, one finds almost 605 villages which are generally sparsely populated and dispersed throughout the District[2].

The mine is situated approximately 25 km south of the town of Steelpoort in the Limpopo Province. The mine is accessed from the R577.

[2] www.sekhukhunedistrict.gov.za

According to the recent official demographic survey results (2016), the Fetakgomo-Tubatse Local Municipality has a total population of 490 381 people (Statistics South Africa Community Survey, 2016).

There is overwhelming strong statistical evidence that the population is growing at an exponential rate. There are more females 251 923 (51%) than males 238 458 (49%) in the population pyramid. Of the total population within the Fetakgomo-Tubatse Local Municipality, 223 214 are young people. The youth thus represents 46% of the total population figure[3].

The mine falls within Ward 27 of the FGTLM and has a population of 12 527 (Statistics from 2011)[4]. Ward 27 has the following villages: Moshate, Tsakane, Kalkontein, Mabelane, Makakatela, Kutullo A&B, Shushumela & Matepe, Kutullo C&D, Dithamaga and Madibeng[5].

Economic Development Sectors

Tourism

Tourism in Fetakgomo Tubatse Local Municipality is underdeveloped as most tourist attraction places are found beyond the boundaries of the municipality, particularly the world famous Blyde River Canyon and a couple of game farms e.g. Kruger National Park, Malamala Game Reserve, etc. are found to the east of the municipal area.

Agriculture

Farming is an important economic resource as a wide range of products are cultivated owing to good soil conditions, the sub-tropical climate and reasonable access to water. The following type of products is produced: fruit, vegetables, grain, cotton, citrus, maize, tobacco and meat. The main resources that encourage agricultural production are the Olifants, Steelpoort and Spekboom Rivers, which provide water to the region. These sources of natural water are essential for present and long term irrigation of crops.

Table below indicates Agricultural production areas.

Table 25: Agricultural Production (Departmental Report 2013)

Production	Total Tons	Total (ha)
Maize (ha)	3 022.9	30 144.59
Sorghum	2 575	8 638
Wheat	2 464	13 945
Sunflower	59	728.1
Groundnuts	13.6	14.9
Soya beans	152.4	3 060.9
Canola	0	50
Bambara nuts	0	633.6
Dry beans	1 560.2	3 092.2
Potatoes	107.7	1 975.3
Cabbage	104	957.6
Butternuts	21.9	200.1
Tomatoes	135.7	340.3
Citrus	1 430.5	10 073
Cotton	0	901.1
Tobacco	21	2222.7
Lucerne	515.8	1760.9
Table grapes	7.1	1390.2

Potential land for agricultural purposes is found on the river banks of three above mentioned rivers, however some of the land is not used optimally e.g. the land at Penge on the river bank of Olifants River and others.

Good agricultural land (Tswelopelo agricultural land) near Praktiseer and Bothashoek is invaded by illegal squatters leaving agricultural activities with not enough land for cultivation. The Tswelopele agricultural scheme in Praktiseer was a very good initiative but has been abandoned by the department of agriculture leaving the entire infrastructure vulnerable to theft.

No other region in the Fetakgomo Tubatse Local Municipality reveals a higher potential for desertion, resultant from overgrazing over a prolonged period by a highly impoverished rural population that struggles to plan and

[3] www.fgtm.gov.za

[4] www.wazimap.co.za

[5] Draft 2018/19 IDP/Budget for Fetakgomo Tubatse Local Municipality

control their area. Their lack of skills prevents them from managing their resource for long-term production. This type of farming makes the region vulnerable to periodic droughts that affect both the regional resources and the potential to generate work opportunities for the unemployed.

Mining

The intrusion of the Volcanic Bushveld Igneous Complex into the sedimentary rock of the Transvaal system resulted in great metamorphism, which caused the introduction of many minerals including chrome, vanadium, platinum, asbestos and magnetite in the area.

- Chrome is mined extensively at Dilokong, Dwarsriver, Dooringbosch, Tweefontein, Lannex Mine, Magareng, Thorncliffe, Helena, Mooihoek and the product is exported by rail and sea to overseas destinations.
- The following chrome mine is still under prospection: Lwala Mine.
- Vanadium is mined and smelted at only one mine and this product caters for most of the demand in the country.
- Platinum is found in the well-known Merensky Ridge and this resource accounts for more than 50% of all platinum resources on earth and is mined at Mototolo (XSTRATA), Marula Mine, Twickenham Mine, Modikwa Mine, Two- rivers Mine and Phokathaba Mine.
- The following platinum mines are still under prospection or at project stage Spitzkop Mine, Grooteboom Mine, Nkwe Platinum Mine, Booysendal, Debrochen and Tjate Mine.
- Two Andalusite mines exist in the areas of Segororng and Modubeng, which are Rhino minerals and Annesley havecroft Mines.
- Granite is mined at Elephant's River Mine near Tjate village.
- Clay is mined at Atta clay mine and most of the product is used in the process of platinum production.
- Asbestos was mined at Penge and Taung, but because asbestos products have been banned worldwide, the mines were closed down and areas are to be rehabilitated.
- Slate is mined at Saringa Mine near Kgautswane village and is used to manufacture roof and floor tiles.
- Silica is mined for the production of sand and stone aggregate and serves as a flux in the chrome smelting process.
- Magnetite is an iron-ore mined at Goede Hoop and transported to Emalahleni for the production of steel in the Highveld Steel Plant.
- Magnisite was mined extensively in the Burgersfort area, but as it does not meet the required standard anymore, mining operations were ceased.
- There are currently three chrome smelters operating in the area, Lion Ferrochrome (XSTRATA), ASA Metals at Ga-Maroga village and Tubatse Ferrochrome in Steelpoort.

Although there are several mines in the area, the existing resources remain unexploited. Investment in this sector is important as it brings with it investment in infrastructure, results in the creation of job opportunities and generates many other economic spin-offs. The lack of economic growth in the region warrants special attention and support to optimize the available opportunities. However, cognisance should be taken of the outflow of money from the mines in Greater Tubatse to other regions.

There are currently three chrome smelters operating in the area surrounding the Dwarsrivier Mine, namely Lion Ferrochrome (XSTRATA), ASA Metals at Ga-Maroga village and Tubatse Ferrochrome in Steelpoort.

1.h.v.2 Type of Environment Affected by the Proposed Activity

Please refer to the preceding section detailing the environmental setting in which the mine is located. The proposed activities will be located in already disturbed areas but will still necessitate the following:

- Diverting of watercourses;
- Clearing of vegetation;
- Removal and stockpiling of soils;
- Shaping of the landscape; and
- Establishment of infrastructure.

These activities may therefore impact on the following:

- Groundwater Setting (establishment of waste related activities);
- Water Setting (establishment of activities and the change in runoff patterns);
- Ecological Settling (removal of ecology and potential spread of invasive species);
- Soils (removal of soils for stockpiling); and

- Topography (shaping).

1.h.v.3 Description of the Current Land Uses

Dwarsrivier Mine has been mining chromite ore from the LG6 seam since 1999. Between 1999 and 2005, ore was mined using opencast methods. The six pits have subsequently been mined out and backfilled with the exception of the South and North Pit portals from which access is gained to the underground workings. The current mine plan extends the life of the operations to the year 2042 (24 years). Dwarsrivier Mine indicated that the mine plan has not changed since the 2015 numerical modelling was undertaken (iLEH, 2015).

The abstraction of groundwater for potable use was included in the assessment presented in this report. Six boreholes are applied for in terms of the WUL (Borehole C is not in use currently) are used for groundwater abstraction, namely BHA, B, C, D1, D2 and E.

All opencast mining has ceased and the pits have been backfilled and partially rehabilitated. These areas were delineated as part of the annual rehabilitation plan, completed by GCS in 2016. Access to the underground workings is gained from both North and South Pits. The two decline shafts are constructed in the high walls of the pits.

Tailings material was backfilled into both North and South Pits. The majority of the tailings material was backfilled into North Pit while the construction of the Northern TSF was completed. A RWD was constructed in the north-western part of North Pit during this period. The RWD was excavated into backfilled tailings and lined with HDPE.

The old TSF situated west of the Plant is partially reprocessed. Tailings are currently deposited in the Northern TSF, which was commissioned in 2012. The remaining life of the Northern TSF is estimated to be around 12 years.

Several dams are used on site to contain and transfer dirty water around the operations. These include two pollution control dams, the Upper RWD and the Lower RWD, situated adjacent to the old TSF. Both dams are lined with HDPE. Extraneous water is pumped from the underground workings to the Clarifier. From here, water is transferred to Dam 26. Approximately half of the extraneous water is pumped back underground for reuse.

Several waste rock dumps (WRD) are situated around the operations. Some of these dumps have been rehabilitated. The operational WRDs are situated to the north of the old TSF (the northern Discard Dump).

Pre-Mining Land Use

Prior to the sale of the land for mining purposes, a portion of the property was used for agriculture under irrigation, the dominant crops being maize, lucerne, cotton and vegetables. The remainder of the property was used for grazing and wilderness land. The valley lines and wetland areas were left uncultivated.

Historical Potential

The estimated dryland production potential of the area is 4 tons per hectare (t/ha). The grazing capacity is approximately seven large stock units per hectare. The irrigated land potential is in the order of 6 - 10 t/ha for maize.

Evidence of Misuse

The only evidence of misuse is erosion gullies in some areas and the presence of borrow pits where the soils and underlying soft rock materials have been removed.

Current Land Use

The current land use for the area is for mining operations, with the Two Rivers and Glencore Thorncliffe Mines operating in the adjacent farm portions. Refer to the following figure.

1.h.v.4 Description of Specific Environmental Features and Infrastructure on Site

The following specific environmental features are present on site:

- Three wetlands identified through the NFEPA database, which are in fact not wetlands but rather the mines' internal Return Water Dams (refer to Section 1.h.v.1.h);
- The site is located in a CBA and ESA. These areas have been assessed and the required tree removal permits have already been obtained (refer to Section 1.h.v.1.e).
- The Dwarsrivier is considered a Flagship River in terms of the NFEPA, and therefore all activities will be located outside of the 1:100 year flood line (refer to Section 1.h.v.1.g).

1.h.v.5 Environmental and Current Land Use Map

Please refer to Figure 38.

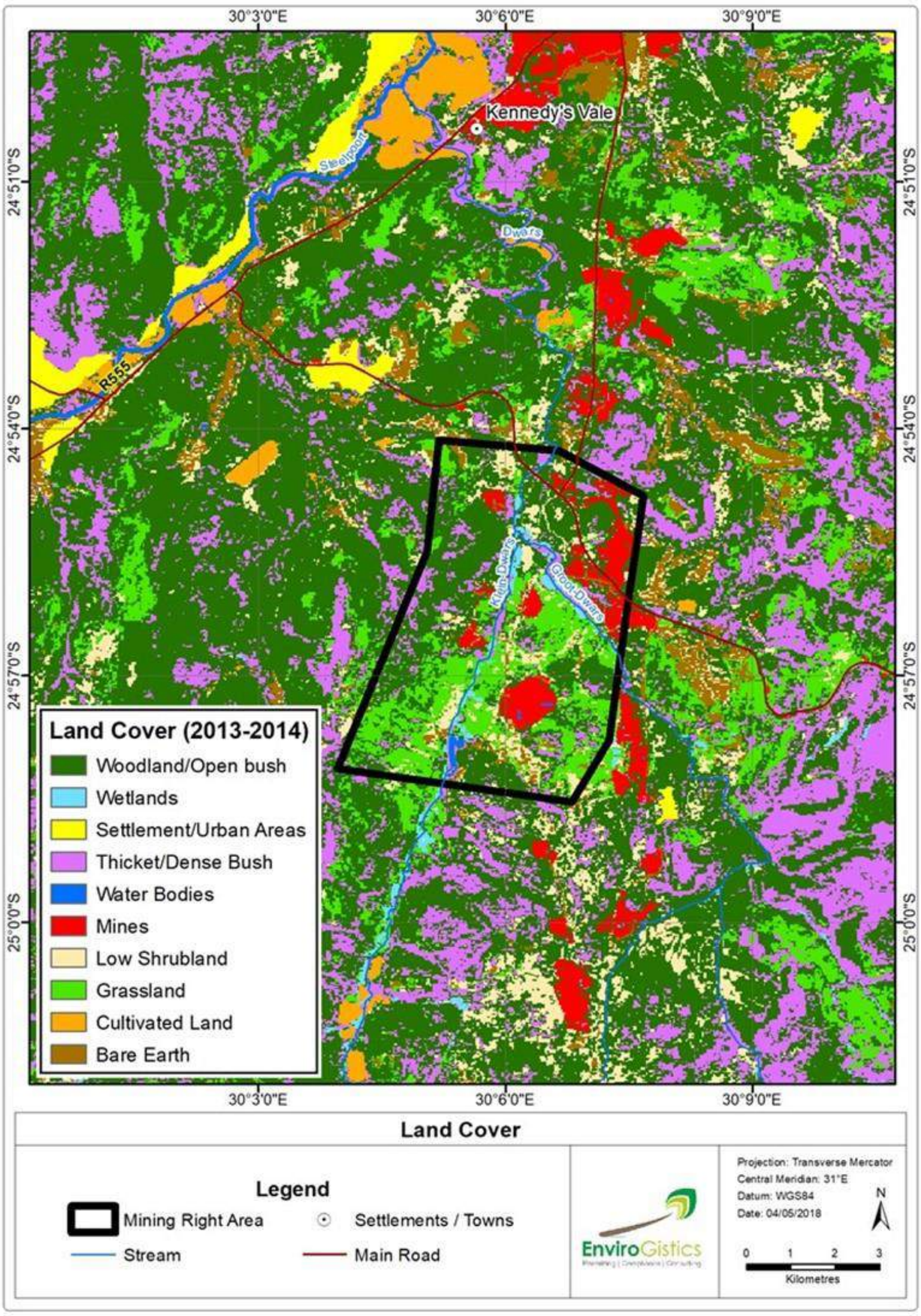


Figure 38: Land use map

1.h.vi Impacts Identified

1.h.vi.1 Methodology used in determining and ranking the Nature, Significance, Consequences, Extent, Duration and Probability of potential Environmental Impacts and Risks

In order to adequately assess and evaluate the impacts and benefits associated with the project it is necessary to use a methodology that could scientifically achieve this and to reduce the subjectivity involved in making such evaluations. For proper decision making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impacts or benefits on the surrounding natural and social environment.

This section will aim to discuss the methodology to be followed to determine, assess and describe possible impacts as a result of project implementation. Impacts will be discussed in terms of the construction, operational and decommissioning/closure phases of the project. The evaluation of impacts is conducted in terms of the criteria discussed below. The various environmental impacts and benefits of this project will be discussed in terms of the nature of the impact, as well as the status, certainty, duration, magnitude, extent, intensity, frequency and significance. The significance rating of each impact will determine whether or not mitigation will be required.

The EIA will also aim to achieve the following:

- Provide an overall assessment of the social and biophysical environments affected by the proposed project;
- Assess the study area in terms of environmental criteria;
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts, and
- Successfully analyse all public issues raised to date in order to recommend appropriate mitigation measures for all social and environmental related concerns.
- Impacts and benefits are assessed before and after the application of mitigation measures.

The following section presents the criteria used to assess the potential impacts presented in the previous section.

1.h.vi.1.a Criteria of assigning significance to potential impacts

The evaluation of impacts is conducted in terms of the criteria detailed in Table 26 to Table 31. The various environmental impacts and benefits of this project are discussed in terms of impact status, extent, duration, probability, and intensity. Impact significance is regarded as the sum of the impact extent, duration, probability and intensity and a numerical rating system has been applied to evaluate impact significance. Therefore, an impact magnitude and significance rating are applied to rate each identified impact in terms of its overall magnitude and significance (Table 31).

In order to adequately assess and evaluate the impacts and benefits associated with the project, it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. To enable informed decision-making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

1.h.vi.1.b Impact Status

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the nature of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The nature of the impact can be described as negative, positive or neutral.

Table 26: Status of Impact

Rating	Description	Quantitative rating
Positive	A benefit to the receiving environment.	P
Neutral	No cost or benefit to the receiving environment.	-
Negative	A cost to the receiving environment.	N

1.h.vi.1.c Impact Extent

The extent of an impact is considered as to whether impacts are either limited in extent or if it affects a wide area or group of people. Impact extent can be site specific (within the boundaries of the development area), local, regional or national and/or international.

Table 27: Extent of Impact

Rating	Description	Quantitative rating
Low	Site Specific; Occurs within the site boundary.	1
Medium	Local; Extends beyond the site boundary; Affects the immediate surrounding environment (i.e. up to 5 km from the Project Site boundary).	2
High	Regional; Extends far beyond the site boundary; Widespread effect (i.e. 5 km and more from the Project Site boundary).	3
Very High	National and/or international; Extends far beyond the site boundary; Widespread effect.	4

1.h.vi.1.d Impact Duration

The duration of the impact refers to the time scale of the impact or benefit.

Table 28: Duration of Impact

Rating	Description	Quantitative rating
Low	Short term; Quickly reversible; Less than the project lifespan; 0 – 5 years.	1
Medium	Medium term; Reversible over time; Approximate lifespan of the project; 5 – 17 years.	2
High	Long term; Permanent; Extends beyond the decommissioning phase; >17 years.	3

1.h.vi.1.e Impact Probability

The probability of the impact describes the likelihood of the impact actually occurring.

Table 29: Probability of Impact

Rating	Description	Quantitative rating
Improbable	Possibility of the impact materialising is negligible; Chance of occurrence <10%.	1
Probable	Possibility that the impact will materialise is likely; Chance of occurrence 10 – 49.9%.	2
Highly Probable	It is expected that the impact will occur; Chance of occurrence 50 – 90%.	3
Definite	Impact will occur regardless of any prevention measures; Chance of occurrence >90%.	4
Definite and Cumulative	Impact will occur regardless of any prevention measures; Chance of occurrence >90% and is likely to result in in cumulative impacts	5

1.h.vi.1.f Impact Intensity

The intensity of the impact is determined to quantify the magnitude of the impacts and benefits associated with the proposed project.

Table 30: Intensity of Impact

Rating	Description	Quantitative rating
Maximum Benefit	Where natural, cultural and / or social functions or processes are positively affected resulting in the maximum possible and permanent benefit.	+ 5
Significant Benefit	Where natural, cultural and / or social functions or processes are altered to the extent that it will result in temporary but significant benefit.	+ 4
Beneficial	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified, beneficial way.	+ 3
Minor Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally benefited.	+ 2
Negligible Benefit	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly benefited.	+ 1
Neutral	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are not affected.	0
Negligible	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are negligibly affected	- 1
Minor	Where the impact affects the environment in such a way that natural, cultural and / or social functions or processes are only marginally affected.	- 2
Average	Where the affected environment is altered but natural, cultural and / or social functions or processes continue, albeit in a modified way.	- 3
Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will temporarily cease.	- 4

Rating	Description	Quantitative rating
Very Severe	Where natural, cultural and / or social functions or processes are altered to the extent that it will permanently cease.	- 5

1.h.vi.1.g Impact Significance

The impact magnitude and significance rating are utilised to rate each identified impact in terms of its overall magnitude and significance.

Table 31: Impact Magnitude and Significance Rating

Impact	Rating	Description	Quantitative rating
Positive	High	Of the highest positive order possible within the bounds of impacts that could occur.	+ 12 – 16
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.	+ 6 – 11
	Low	Impacts is of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.	+ 1 – 5
No Impact	No Impact	Zero impact.	0
Negative	Low	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.	- 1 – 5
	Medium	Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action may be required.	- 6 – 11
	High	Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt.	- 12 - 16

1.h.vi.2 Impacts and Risks identified

The following table presents the potential list of impacts, which will be assessed as part of the specialist studies during the EIA Phase.

Table 32: Potential Impacts – Planning Phase

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
Planning Phase																	
Legal Requirements (Environmental Permits)	1, 2, 3, 4 &5	Legal Compliance	Unlawful water and waste activities, which could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised. All legally appointed personnel responsible or involved in water use activities and activities associated with the Environmental Authorisations on site must receive training on the requirements of the Environmental Authorisations and relevant Environmental Legislation. Quarterly (construction) and biannual (after construction) internal audits must be undertaken during the construction phase, whereafter annual internal audits can be undertaken on the lawful implementation of the Environmental Authorisation Water Use Licence (WUL) must be available on site at all times. The following buffers should be maintained: No activities within 1:100 year flood line unless approved in terms of the NWA; No activities of 100m^2 and more may be undertaken within 32m of the riparian zones unless approved in terms of the NEMA; Where necessary and recommended as part of the Heritage Assessment, buffers must remain as stipulated, alternatively the required permits must be obtained from the SAHRA should this be determined necessary. The legal register must be updated to indicate all activities associated with Environmental Authorisations.	P	4	3	5	5	17	CbA
Land Claims	Unknown	Socio-Economic	According to the IDP there are land claims present on the farm Dwarsrivier. The exact portions are unknown, and a request to the Department of Land Affairs and Rural Development has been submitted on 26 April 2018 in order to obtain more clarity on this matter. It should be noted that the activities proposed are within the existing established mining infrastructure, with the exception of the drilling sites, which is of short timeframe, as these are undertaken in order to plan the future underground mining activities within the approved Mining Rights Area.	N	-3	-3	-4	-4	-14	The mine should obtain clarity on where land claims have been lodged within the Mining Rights Area. The mine should ensure that they are abreast the developments of the land claim assessment and in consultation with the relevant department. All activities should remain within the approved contracts.	-	-1	-2	-1	-1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
All projects	1	Landowner Relationships	Unlawful access to land or mining activities	N	-2	-2	-3	-3	-10	Early consultation to determine the requirements of both parties. Land purchase agreement must be finalised prior to the establishment of the RWD on Portion 6 of the farm Dwarsrivier, owned by TRP, should this option remain feasible.	-	-1	-1	-1	-1	-4	CbA
	1 &2	Ecology, hydrology and freshwater resources.	Potential poor planning leading to excessive or unnecessary clearing of vegetation outside of the demarcated infrastructure areas and access roads.	N	-3	-2	-4	-4	-13	Clearly demarcate the areas planned for construction in line with the sensitivity maps.	-	-2	-1	-1	-2	-6	CbA
	1	Heritage	Various heritage resources have been demarcated.	N	-2	-2	-3	-3	-10	The exclusion zones as stipulated in the heritage assessment should be adhered to and no drilling activities may be undertaken in these areas.	-	-2	-1	-1	-1	-5	CbA
	1	Socio-Economic	Unlawful and unscheduled access.	N	-3	-2	-4	-4	-13	Detailed contracts must be drafted to avoid later disputes. These contracts should include the timing of activities and the people who will access the land. All activities should remain within the approved contracts. A list of contact people and responsible parties should be finalised.	-	-2	-1	-1	-1	-5	CbA

Table 33: Potential Impacts – Construction Phase

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
Construction Phase																	
Land and Footprint Clearance	-	Geology	No direct impact - Activities will not be constructed over future planned mining areas.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Topsoil Stripping and Stockpiling and Vegetation Removal	1, 2 & 3	Topography	Direct impact: Alteration of topography. Removal of vegetation and the associated shaping of the area will lead to change in topographical characteristics of the area. The impact is not considered significant due to the fairly flat nature of the topography and the location of the activities in the immediate vicinity of the existing plant area should Site B be the selected option.	N	-1	-3	-3	-2	-9	The footprint areas of all surface infrastructure must remain as small as possible within the parameters of operational and engineering requirements. Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If	N	-1	-1	-2	-1	-5	R

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										proved insufficient for control, these shall be replaced by fencing.							
										Designs of the facilities (TSF and landscaping) must be undertaken by a registered Engineer.							
										Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place.							
										Removal of vegetation must be undertaken in a phased approach to limit surface exposure.							
										Temporary erosion control measures may be used to protect the disturbed soils during the construction phase until adequate vegetation has established.							
										Clean and dirty water separation must be implemented early in the construction phase, especially down-gradient of construction areas to ensure that the natural runoff patterns are impacted as little as possible.							
										Activities must remain outside of the 1:100 year flood lines, where this is not possible, the required approval must be obtained from the DWS and activities should further be restrained to the dry season.							
										Linear infrastructure must follow for as far as practically possible the natural contours of the area.							
	1, 2, 3, 4 & 5	Soil, Land Use and Land Capability	Direct impact: The removal and stockpiling of topsoil may lead to a loss of soil resource and land capability through erosion of the stockpiles and chemical and physical degradation. This impact is considered important due to the fact that the mine may be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation.	N	-1	-3	-5	-4	-13	Unnecessary disturbances of the potentially arable soils (i.e. Hutton, Bonheim) can be avoided where possible to minimise loss of arable soils.	N	-1	-1	-2	-1	-5	R
										Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMP (Soil Utilisation Guideline). Prior to construction of the road the soil will be stripped and placed on a soil stockpile.							
										Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure.							
										Where possible separate stockpiling of different soil type groups (to obtain the highest post-mining land capability.							
										Any new topsoil stockpiles should not exceed the recommended height in terms of the Topsoil Management Plan, 2016 of 2-4m. Should three (3) meters be exceeded, erosion control measures should be implemented.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										Temporary stockpiles must be protected by means of suitable geotextiles such as hessian sheeting, silt curtains, sandbags etc. to prevent contamination of runoff and sedimentation of freshwater resources in the vicinity of the surface infrastructure and should remain outside of the buffer zones.							
										Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure. These stockpiles should also be kept free of alien vegetation at all times to prevent loss of soil quality.							
			Direct impact: Soil compaction	N	-1	-4	-2	-2	-9	The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area.	N	-1	-1	-2	-1	-5	R
										A site plan must be developed, indicating the following: • Location of all approved activities; • 1:100 year buffer around all watercourses; • Location of the CBA and Endangered Ecosystems and mark these areas where construction is not approved as a no-go zone's • All vegetation management zones as per the Biodiversity Action Plan (BAP).							
										Laydown areas should be located on disturbed soils (anthrosols) to avoid compaction of natural soils.							
										All contractors must receive induction. The induction should be updated on site, to make provision for the site plan and a detailed explanation on the purpose of the no-go zones, presence of protected species, presence of the CBA and ESAs and the meeting thereof.							
										The management of topsoil stockpiles should be undertaken in terms of the Topsoil Management Plan, 2016 to ensure that the topsoil stockpiles maintain its integrity and are not subjected to compaction.							
										A fine system/disciplinary system must be implemented on site for all significant or recurring environmental non-compliances.							
										Site clearance and activities should be restricted to the approved footprint. Contractors areas should be established on already disturbed footprints.							
										Vegetation clearance and commencement of construction can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low such that the soils are less prone to compaction.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			Clearing vegetation will result in the exposure of soil, which may in turn lead to soil erosion. This impact is considered important due to the fact that the mine may be operating on a negative topsoil balance and therefore the retaining of suitable topsoil is important for successful rehabilitation.	N	-1	-3	-5	-4	-13	Adhere to Storm Water Management Plan (SWMP), developed by SWS, 2016 or any approved update thereafter. Ensure that all design drawings include effective erosion control measures. Ensure the required erosion protection measures are monitored and corrected where necessary. Natural vegetation establishment (self-succession) will be encouraged on cleared areas, and topsoil stockpiles. If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. The mine will investigate an appropriate seed mix for the rehabilitation purposes should self-succession not establish on rehabilitated sites. If possible, vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when the erosive stormwater and wind are anticipated to be low. The footprint of the proposed areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible. No construction or project related activities may be undertaken outside of the demarcated areas. Clean and dirty water systems must be established prior to construction. No open fires must be allowed. Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters.	N	-1	-2	-2	-1	-6	R

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										The mine will ensure that erosion controls are included in the designs of all linear infrastructure (roads, conveyors, pipelines or open channels) and points of water discharge (where required).							
			Displacement of faunal species and human/animal conflict. Due to the fact that the site is located within an existing operation mining footprint, and directly adjacent to the plant and perimeter of the existing water management facilities, the impact is not regarded to be as significant as it would have been for a green fields site.	N	-1	-2	-4	-3	-10	A record of any animal fatalities should be kept on site. The reason for the fatality and action to avoid such in the future (if possible) should be stated. Construction and site clearance should be undertaken in a systematic approach to allow animals to relocate from the site where construction will take place. All employees, or contractors on site, involved in this project, should receive a detailed induction on the expectations for the protection of fauna and flora on site. Clearance of vegetation must be undertaken in such a manner as to provide sufficient time for animals to relocate.	N	-1	-1	-3	-1	-6	R
			Loss of ecological connectivity and ecosystem functioning.	N	-3	-2	-4	-4	-13	No construction or project related activities may be undertaken outside of the demarcated areas. The construction area should, if possible, be isolated by means of a chain link fence or demarcation tape in order to prevent animals on local migrations entering the area and being killed. All areas should be rehabilitated once construction has been compiled. In the establishment of fences, erect fences in such a manner as to limit the potential of animals to enter the project areas. This could involve the placement of rocks and materials at on the surface of the fences.	N	-1	-1	-2	-3	-7	R
			The disturbance of the cleared areas may allow the establishment of alien invasive vegetation. Increased prevalence of exotic invasive species: The fact that the area will be cleared for construction creates niches that can be colonised by exotic and/or invasive species. This is compounded by the fact that trucks and other heavy machinery often act as vectors for seeds of these species.	N	-2	-4	-5	-1	-12	Weed eradication should be implemented on site. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.	N	-1	-1	-2	-1	-5	R
			Habitat degradation due to dust: Increased dust will occur in all areas where vegetation is cleared. Dust will be caused by excavation, and construction. Dust in the area will be greatly increased due to the dry weather conditions and the nature	N	-2	-2	-3	-2	-9	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Dust suppression should be undertaken where and when dust is present.	N	-1	-1	-2	-1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			of the soil in the area. Dust settling on plant material can reduce the amount of light reaching the chlorophyll in the leaves, thereby reducing photosynthesis, which in turn reduces plant productivity, growth and recruitment.														
			Direct Impact: Increased erosion can eventually lead to the loss of vegetation and habitats for further species. Soils in the area are prone to erosion in areas where vegetation is cleared, this is further compounded by the fact that precipitation in the area occurs through heavy rainfall events in in the form of thundershowers in summer. Furthermore large areas will be cleared before construction leaving these areas prone to erosion.	N	-3	-3	-5	-5	-16	Ensure the required erosion protection measures are monitored and corrected where necessary. Storm water management plan should be implemented prior to construction to ensure that runoff does not lead to the formation of erosion gulleys. Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters. An erosion monitoring and mitigation plan should be put in place.	N	-1	-1	-2	-2	-6	CbA
	1, 3, 4 & 5	Riparian Habitat & Wetlands	Activities in close proximity to the watercourses could lead to: 1. Potential direct loss of instream, riparian or floodplain habitat. 2. Increased hardened surfaces and compacted soils thus reducing integrity of interflow. 3. Increased surface water runoff, leading to erosion, and sedimentation of freshwater resource habitat. 4. Loss of foraging and breeding habitat for aquatic/wetland-dependent fauna. 5. Proliferation of alien vegetation as a result of disturbances. 6. Sediment-laden runoff entering freshwater habitat leading to altered water quality and smothering of vegetation and changes to aquatic habitat. 7. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths.	N	-3	-2	-2	-3	-10	Ensure that surface infrastructure footprint does not encroach on freshwater resource habitats unless authorised in terms of a WUL granted by the DWS and that vegetation clearing is limited to essential areas only. All freshwater resource habitats in the vicinity of the surface infrastructure footprint are to be designated "No Go" areas and off-limits to all personnel and vehicles. Ongoing biomonitoring should be undertaken at the upstream and downstream points at perennial water systems. The storm water management plans should be implemented in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter the existing watercourses. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. Implement and maintain alien vegetation management programme. Ensure all soil stockpiles are adequately protected with appropriate geotextiles (e.g. hessian sheeting), silt curtains, sandbags etc. to prevent sedimentation. Monitor areas in the vicinity of soil stockpiles and proactively manage any areas of erosion which may	N	-2	-1	-1	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										form as a result of the formation of preferential flow paths.							
	1, 3, 4 & 5	Hydrology	The removal of vegetation can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of watercourses as well as pollution control facilities.	N	-3	-2	-2	-3	-10	Rehabilitate open areas as soon as practically possible. Self-succession should be encouraged. If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. The storm water management plans should be implemented in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter the existing watercourses. Limit the areas to be cleared to the demarcated sites.	N	-1	-1	-1	-2	-5	CbA
	-	Geohydrology	No direct impact during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1 & 2	Heritage	A Scoping Assessment has been completed for the proposed project. The current area of impact is listed below and will be further assessed during the EIA phase: • The stone wall foundations of a ruin and a possible Early Iron Age site was recorded within Site B. The study area is however disturbed, possibly by previous cultivation reducing the significance of the recorded finds. The recorded sites will require limited mitigation. • From a heritage point of view the heritage sensitivity associated with Site C is high due to the Iron Age sites recorded in the impact area and this option is therefore the least suitable for the proposed development. • Site D is from a heritage point has previously been disturbed and no heritage resources were identified inside the footprint area of the proposed TSF. It should be noted that a cemetery occurs on the periphery of the site, and this area should be demarcated and avoided. • Graves are also present on the periphery of the proposed Diesel and Emulsion Storage Areas which should be protected.	N	-3	-3	-3	-4	-13	The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below. This procedure applies to the Mine's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. • Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below. • If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the mine, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to	N	-1	-1	-2	3	-1	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										their immediate supervisor, and through their supervisor to the senior on-site manager. • It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area. • The senior on-site Manager will inform the Environmental Control Officer (ECO) of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA. • The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefor chance find procedures should be put in place as part of the EMP.							
	1, 2, 3, 4 & 5	Visual	Soil stripping and footprint clearance	N	-1	-2	-1	0	-4	Stripping of vegetation and soils should be undertaken within the demarcated areas.	N	-1	-1	-1	0	-3	R
	1		Additional placement of lighting on the TSF.	N	-3	-2	-1	0	-6	Down lighting and lighting shields should be used as far as possible.	N	-1	-1	-1	0	-3	R
	1, 2, 3, 4 & 5	Air Quality	Dust-fallout	N	-2	-2	-3	-2	-9	Utilised the existing monitoring network to monitor dust fall out in and around the construction area. Strictly enforced speed limits on all roads All areas should be rehabilitated once construction has been compiled, and in the case with the drilling pads, once the drilling activities at that pad had been concluded. Bare soils can be regularly dampened with water to suppress dust during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast Limit site clearance to designated areas.	N	-1	-1	-2	-1	-5	CbA
	All	Noise	The area is located within the mining area. Noise impacts are not considered to be significant but can occur during excavation and construction activities.	N	-1	-2	-1	-1	-5	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	N	-1	-1	-1	-1	-4	CbA
	-	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Establishment of Surface Infrastructure	1	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3, 4 & 5	Topography	During the site clearance activity, the required storm water management systems and shaping of land would have been completed. The construction of the	-	-3	-3	-3	-2	-11	Activities should be constructed and developed within the approved design concepts. Specifically in terms of the TSF, the design and construction	N	-2	-2	-2	-1	-7	R

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			TSF will have the greatest impact on the topographic setting of the area.							should be undertaken with closure design principles.							
	1, 2, 3, 4 & 5	Soil, Land Use and Land Capability	Construction activities with surrounding exposed soil may in turn lead to soil erosion.	N	-1	-2	-3	-4	-10	Ensure that all design drawings include effective erosion control measures and that these are implemented during the establishment of the infrastructure. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas. Clean and dirty water systems must be established prior to construction and must be maintained throughout the life of mine. Where vegetation cannot be established during the life of construction and operations, appropriate measure will be taken to control erosion. These will include grading of surfaces to prevent rapid run-off of storm water and / or the use of energy dissipaters. Provision should be to protect the soils from hydrocarbon spills/drips by the vehicles and refuelling trucks entering and existing the site (i.e. grid system or permanently manned personnel to treat soils during periods of refuelling). Where erosion gulleys are formed, these will be recorded on the IsoMetrix system for immediate action.	N	-1	-1	-2	-1	-5	CbA
	-	Terrestrial Ecology (Fauna & Flora)	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 4 & 5	Riparian Habitat & Hydrology	The establishment of activities in close proximately to riparian systems could lead to encroachment of activities.	N	-3	-2	-2	-3	-10	Activities should be constructed and developed within the approved design concepts. Limit vehicle/machinery activity within the active channel as well as in the riparian zone to what is absolutely essential. Disturbances to the riparian zone should be limited as far as possible. Re-fuelling of vehicles to take place outside of the riparian zone & associated buffer zones, on sealed surfaces. Hot spots for build-up of debris must be identified and debris must be regularly removed to prevent flooding and damage of infrastructure. In this regard, special mention is made of periods following high rainfall and subsequent high instream water volumes.	N	-1	-1	-1	-2	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										The riparian zone must be monitored for alien vegetation encroachment and all alien vegetation/weeds must be removed according to a suitable alien vegetation control plan. Any erosion or gully formation must be identified on an ongoing basis and re-profiled and revegetated accordingly.							
	1	Geohydrology	Impact on the alluvial aquifer due to the presence of the TSF.	-	-3	-3	-3	-3	-12	The TSF should be lined according to the identified designs. Ongoing groundwater monitoring must be undertaken.	N	-2	-2	-1	-1	-6	CbA
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	Visual	Impact on the visual character of the site.	N	-2	-2	-4	-3	-11	Activities should be restricted within the approved footprints. The TSF should be lined according to the identified designs.	N	-2	-1	-2	-2	-7	R
	-	Air Quality	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Noise	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3, 4	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3, 4	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3, 4 & 5	Soils	Contamination of soil resources due to hydrocarbon spills.	N	-1	-2	-4	-4	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded (bunds to be 110% of volume of the materials stored) areas. All fuels and soils must be stored in appropriate containers. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas.	N	-1	-2	-1	-1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.							
			Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	Chemical toilets must be readily available to employees where permanent infrastructure is not available. Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites. Proof of the required licences of waste removal companies and receiving sites should be in place on site.	-	-1	-2	-1	-1	-5	CbA
	1, 2, 3, 4 & 5	Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	N	-2	-3	-3	-4	-12	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-2	-1	-5	CbA
	1, 2, 3, 4 & 5	Riparian Habitat	The various projects are located in close proximity to the riparian habitat.	N	-3	-2	-3	-3	-11	Remain at all times outside of the 1:100 year flood line of the watercourses unless approved in terms of the necessary legislation. No waste is permitted to be disposed of within any freshwater habitat, and ensure that all waste is removed to an appropriate disposal facility. Ongoing biomonitoring should be undertaken at the upstream and downstream points of perennial point sources. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. The storm water management plans should be implemented in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter the existing watercourses. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-1	-2	-5	CbA
	1, 2, 3, 4 & 5	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas.	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.							A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams.							
										Waste management training must be implemented on site.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Hazardous waste handling should only take place within bunded and/or lined areas.							
										Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.							
										Clean any spills within 24 hours.							
										Documentation of removal and safe disposal must be available on site.							
										The mine will adopt a cradle-to grave approach to ensure that the waste is removed and disposed of in a legally compliant manner.							
										Notify the relevant regulatory authorities in the event of the occurrence of a reportable incident.							
										Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.							
			Handling and storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-1	-5	CbA
										Waste management training must be implemented on site.							
										Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Access control must be strictly enforced.							
										Waste should be disposed of by licensed companies to licensed facilities.							
										Recycling practices must be investigated and implemented on site.							
	1, 2, 3, 4 & 5	Groundwater	Large scale hydrocarbon spills could be present at the mining area.	N	-3	-1	-4	-4	-12	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP.	N	-2	-1	-2	-1	-6	CbA
										No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site. Any spills occurring during the collection process must be cleaned up immediately. Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET, Catchment Management Agency/DWS). All equipment and machinery should be kept in good working order. A clean up procedure (i.e. Works Instruction) must be in place. Clean any spills within 24 hours.							
			Handling or Hazardous Waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. The workshop should be designed with the suitable waste containment measures (berms, sumps, oil separators). Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6	CbA
			Handling and storing of Domestic Waste	N	-2	-2	-1	-2	-7	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. All waste must be removed by licensed contractors and disposed of at a licensed landfill site. As a duty of care and the cradle to grave principles, the mine should regularly inspect disposal site to ensure that best practices are implemented. Recycling practices must be investigated and implemented on site where practical.	N	-1	-1	-1	-2	-5	CbA
	-	Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
	-	Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 34: Potential Impacts – Operational Phase

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
Operational Phase																	
Operation of all Activities	1	Geology	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	The ongoing operation of the TSF will have the greatest impact on the topographic setting of the area.	-	-3	-3	-3	-2	-11	The TSF should be operated and designed in terms of the approved designs.	N	-2	-2	-2	-1	-7	R
		Soil	Contamination of Soil due to hydrocarbon spills	N	-1	-2	-4	-4	-11	Vehicles and machinery will be regularly maintained. Maintenance programmes will be established and implemented. All refuelling of vehicles and equipment maintenance must be done within designated bunded areas. Spill and absorption kits must be available and readily accessible at the truck parking. There should always be a spare kit available at any given time. If necessary, the polluted soils will be remediated and affected areas rehabilitated.	N	-1	-1	-2	-1	-2	CbA
		Ecology	The establishment of Weeds and Invader Species.	N	-2	-3	-4	-4	-13	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-1	-1	-2	-1	-2	R
			Accidental death of animals on the roads.	N	-2	-3	-2	-5	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	N	-1	-3	-1	-3	-1	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. Vehicles may only travel on demarcated roads on site.							
		Hydrology	Contamination of surface water resources.	N	-3	-2	-3	-3	-11	Ongoing water, biomonitoring and groundwater monitoring should be undertaken. The freeboard of the RWD should be maintained.	CbA	-	-	-	-	-	-
		Geohydrology	Contamination of groundwater resources.	N	-3	-3	-3	-3	-12	The leak detection systems of the TSF should be monitored regularly. Quarterly engineering inspections should be undertaken to ensure that the disposal methodology and designs, as well as the stability considerations are in line with the design principles. Ongoing water, biomonitoring and groundwater monitoring should be undertaken.	N	-1	-2	-1	-2	-6	R
		Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	N	-2	-1	-3	-3	-9	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Dust suppression should be undertaken if required [(i.e. on recommendation by the Environmental Control Officer and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)]. Roads around office areas will be paved as far as practically possible. During operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet to reduce dust creation. Tarpaulins will be placed over all vehicles transporting product.	N	-1	-1	-2	-2	-2	CbA
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	Noise of vehicles traversing the access roads will create a constant source of noise. It is however not foreseen that the roads proposed would contribute to any additional noise levels in the area.	N	-1	-4	-1	-1	-7	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations. All vehicles will have muffles to minimise noise emissions, where necessary. Where noise becomes a nuisance nose management measures will be investigated and implemented to address these concerns. Noise monitoring will be undertaken (ambient conditions) to ensure that noise levels comply with Health and Safety Standards.	N	-1	-1	-1	-1	-4	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
		Visual	The development of the TSF and the potential dispersion of dust may have a negative impact on the surrounding aesthetics.	N	-2	-2	-4	-3	-11	Activities should be restricted within the approved footprints and be operated in line with the approved designs. Ongoing dust monitoring should be undertaken.	N	-2	-1	-1	-1	-5	R
		Socio-Economic	Unlawful and unscheduled access.	N	-3	-2	-4	-4	-13	Detailed contracts must be drafted to avoid later disputes. These contracts should include the timing of activities and the people who will access the land. All activities should remain within the approved contracts. A list of contact people and responsible parties should be finalised.	-	-1	-2	-1	-1	-5	CbA
		Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diesel Storage and Underground Supply	3	Soils	Contamination of soil resources due to hydrocarbon spills.	N	-1	-2	-4	-4	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded areas (bunds to be 110% of volume of the materials stored). All fuels and soils must be stored in appropriate containers and bunded areas. Provision should be made to protect the soils from hydrocarbon spills/drips by the vehicles and refuelling trucks entering and existing the site (i.e. grid system or permanently manned personnel to treat soils during periods of refuelling). Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements. Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained. A spill kit must be provided to be used in the event of a spill. If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET, Catchment Management Agency/DWS). Pipelines but be monitored in terms of volumes of water piped to the underground workings. Monitoring should be recorded on the mine recording system (active at any time) to determine when there may be a potential leak on a pipeline.	N	-1	-2	-1	-1	-5	R

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										Safety signage must be used at designated storage areas as well as transportation pipelines. At least weekly inspections should be undertaken around the diesel and emulsion areas and supply pipelines. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.							
		Ecology	Spills of hydrocarbons could damage the ecological character along pipeline routes.	N	-2	-3	-3	-4	-12	Pipelines but be monitored in terms of volumes of hydrocarbons and oils piped to the underground workings. Monitoring should be recorded on mine recording system (active at any time) to determine when there may be a potential leak on a pipeline. At least weekly inspections should be undertaken around the diesel and emulsion areas and supply pipelines.	N	-1	-1	-2	-1	-5	CbA
		Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Riparian Habitat	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	Handling of hydrocarbons and associated hazardous waste (old oils and contaminated soils) the area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. A detailed waste management strategy will be established and implemented, which will clearly demarcate the containments for different waste streams. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. The monitoring of Total Petroleum Hydrocarbons (TPH) should be undertaken as part of the monitoring network. Hazardous waste handling should only take place within bunded and/or lined areas. Clean spills, if occur within 24 hours. Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be kept on record and in good order. The mine will adopt a cradle-to grave (inspection of disposal sites) approach to ensure that the waste is removed and disposed of in a legally compliant manner.	N	-1	-1	-2	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.							
			Handling and storing of Domestic Waste in the area should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. Waste management training must be implemented on site. Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed. Clear signs informing staff of waste management practices must be implemented on site. Access control must be strictly enforced. The berm upstream of the facility must be maintained. Recycling practices must be investigated and implemented on site.	N	-1	-1	-2	-1	-5	CbA
		Groundwater	Large scale hydrocarbon spills could be present at the mining area.	N	-1	-1	-4	-4	-10	Pipelines but be monitored in terms of volumes of hydrocarbons and oils piped to the underground workings. Monitoring should be recorded on mine recording system (active at any time) to determine when there may be a potential leak on a pipeline. At least weekly inspections should be undertaken around the diesel and emulsion areas and supply pipelines. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. Provision should be to protect the soils from hydrocarbon spills/drips by the vehicles and refuelling trucks entering and existing the site (i.e. grid system or permanently manned personnel to treat soils during periods of refuelling). The monitoring TPH should be undertaken as part of the monitoring network. All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site. Any spills occurring during the collection process must be cleaned up immediately. Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET, Catchment Management Agency/DWS).	N	-1	-1	-2	-1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										All equipment and machinery should be kept in good working order.							
										A clean up procedure (i.e. Works Instruction) must be in place.							
			Handling of hydrocarbons and associated hazardous waste (old oils and contaminated soils) the area could lead to contamination of groundwater if not well managed.	N	-2	-2	-2	-4	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-2	-6	CbA
										The workshop should be designed with the suitable waste containment measures (berms, sumps, oil separators).							
										Waste management training must be implemented on site.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.							
										Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.							
										Documentation of removal and safe disposal must be available on site.							
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waste Management and Handling Hydrocarbon spills within the Mining Area and the management of Domestic and Hazardous Waste	1, 2, 3 & 4	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Contamination of soil resources due to hydrocarbon spills.	N	-1	-2	-4	-4	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded areas (bunds to be 110% of volume of the materials stored).	N	-1	-2	-1	-1	-5	R
										All fuels and soils must be stored in appropriate containers.							
										Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.							
										Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages							
										Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.							
										A spill kit must be provided to be used in the event of a spill.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										If a spill occurs, the contaminated soil must be removed immediately. Contaminated soil must be stored according to best practices until it can be disposed of at a suitably licensed facility. Safety signage must be used at designated storage areas. All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.							
			Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	Chemical toilets must be readily available to employees where permanent infrastructure is not available. Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites.	-	-1	-2	-1	-1	-5	-
		Ecology	The unmanaged disposal of waste, could result in the spread of invader species, as well as the influx of opportunistic species.	N	-2	-3	-3	-4	-12	Develop dedicated waste handling areas; prevent access to rodents and opportunistic species; prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-2	-1	-5	CbA
		Riparian Habitat and Wetlands	Various non perennial drainage channels are present in this area.	N	-3	-2	-2	-3	-10	Remain at all times outside of the 1:100 year flood line of the watercourses unless authorised in terms of a WUL issued by the DWS. Ongoing biomonitoring should be undertaken at the upstream and downstream points. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. The storm water management plans should be implemented in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter the existing watercourses. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	N	-1	-1	-1	-2	-5	CbA
		Surface Water	Handling of Hazardous Waste within diesel storage areas, laydown areas and general mine areas could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. A detailed waste management strategy will be established and implemented, which will clearly	N	-1	-1	-2	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			on the integrity of the storm water system and also the production.							demarcate the containments for different waste streams.							
										Waste management training must be implemented on site.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Hazardous waste handling should only take place within bunded and/or lined areas.							
										Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET, Catchment Management Agency/DWS).							
										Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.							
										Documentation of removal and safe disposal must be kept on record and in good order.							
										The mine will adopt a cradle-to grave (inspection of disposal sites) approach to ensure that the waste is removed and disposed of in a legally compliant manner.							
										Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.							
			Handling and storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-1	-5	CbA
										Waste management training must be implemented on site.							
										Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Access control must be strictly enforced.							
										Recycling practices must be investigated and implemented on site.							
		Groundwater	Large scale hydrocarbon spills could be present at the mining area.	N	-1	-1	-4	-4	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-1	-5	CbA
										No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.							
										Any spills occurring during the collection process must be cleaned up immediately.							
										Any significant spills must be captured in the incident reports and must be reported to the relevant department (LEDET, Catchment Management Agency/DWS).							
										All equipment and machinery should be kept in good working order.							
										A clean up procedure (i.e. Works Instruction) must be in place.							
			Handling or Hazardous Waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-1	-1	-2	-2	-6	CbA
										The workshop should be designed with the suitable waste containment measures (berms, sumps, oil separators).							
										Waste management training must be implemented on site.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Hazardous waste handling should only take place within bunded and/or lined areas, with a capacity of at least 110% of the volume stored.							
										Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site.							
										Documentation of removal and safe disposal must be available on site.							
			Handling and storing of Domestic Waste	N	-3	-3	-3	-3	-12	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	N	-2	-3	-2	-2	-9	CbA
										Waste management training must be implemented on site.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										All waste must be removed by licensed contractors and disposed of at a licensed landfill site.							
										As a duty of care and the cradle to grave principles, the mine should regularly inspect disposal site to ensure that best practices are implemented.							
										Recycling practices must be investigated and implemented on site.							
										Records and manifests of waste disposal should be kept on file and in good order.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 35: Potential Impacts – Decommissioning Phase

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
Decommissioning and Closure Phase																	
Legal Requirements (Environmental Permits)	1, 2, 3, 4 & 5	Legal Compliance	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	N	-4	-3	-2	-5	-14	A legal assessment of all activities must be undertaken annually to ensure that all are licensed. A detailed closure plan must be developed and submitted to the relevant departments for approval. All legally appointed personnel responsible or involved in activities on site must receive training on the requirements of the Environmental Authorisations and EMPs Quarterly decommissioning must be undertaken, on the lawful implementation of the Environmental Authorisation Environmental Authorisations must be available on site at all times. The legal register must be updated to indicate all updated activities.	P	4	3	5	5	17	CbA
Rehabilitation of activities		Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	Returning the area to be stable and free draining.	N	-2	-3	-5	-4	-14	The TSF should be closed in terms of the approved design principles. The roads should be sloped and landscaped to blend into the surrounding environment. Where the slopes have steep gradients due to the surrounding landscape measures should be implemented to assist with the trapping of seeds and to protect the crest from wind erosion All rehabilitated areas should be effectively fenced off to avoid access thereto by unauthorised parties up until full rehabilitation has been achieved.	P	2	3	3	5	13	CbA
		Soils	Decommissioning activities could lead to additional erosion in the area.	N	-1	-3	-5	-4	-13	Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly	P	2	3	3	5	13	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation							
										Where the slopes have steep gradients due to the surrounding landscape measures should be implemented to assist with the trapping of seeds and to protect the crest from wind erosion							
										All rehabilitated areas should be effectively fenced off to avoid access thereto by unauthorised parties up until full rehabilitation has been achieved.							
		Ecology	The decommissioning activities could lead to the increase of the harvesting of plants in the area. Other activities identified by the specialist included: Potential ineffective rehabilitation will lead to the proliferation of alien and invasive plant species and further floral habitat and species loss. Bare soil areas, if not rehabilitated will lead to increased runoff, erosion and the sedimentation of downslope habitats. Potential continued loss of habitat will result in a loss of floral SCC. Permanently altered habitat may result in the alteration of floral species abundance and diversity of which a number are endemic to the region.	N	-3	-3	-3	-5	-14	All contractors must receive induction. The induction should be updated on site, to make provision for the site plan and a detailed explanation on the purpose of the no-go zones, presence of protected species, presence of the CBA and ESAs and the meeting thereof.	P	3	3	3	5	14	CbA
										Harvesting of plants and poaching of animals will be prohibited and a fine system will be developed for any person not complying.							
										No open fires must be allowed.							
										A grass mixture off endemic grasses recommended by an ecologist should be utilised in the seeding process. Note that hydro-seeding is primarily for grasses and smaller shrubs. Larger shrubs and trees will need to be hand-planned.							
										The seed mixture should be incorporated into mulch which includes fertiliser and germination acceleration agents where required.							
										Regular application of fertiliser should take place, where identified, in order to ensure efficient establishment of vegetation cover until such time as sufficient organic matter is being produced by the established grasses to allow for self-sustaining growth.							
										Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation. The recovered soils during construction should be re-used to rehabilitate the mine footprint following mine closure							
										If re-seeding for basal cover establishment was not effective during 1st application, a second application of hydro-seed mixture may have to be applied in certain areas. The application of hydro-seed should be at the discretion of the specialist contractor.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										No grazing on rehabilitated areas is to occur within three years of reseeding completion Once sufficient basal cover has been established, the introduction of species representative of the Sekhukhune Mountain Bushveld vegetation type may commence. Once sufficient basal cover has been established, the introduction of species representative of the Sekhukhune Mountain Bushveld vegetation type may commence. Introduction of these species should commence through the stages of natural succession, i.e. Pioneer species (grasses, herbaceous species), Secondary species (grasses, small shrubs, and small trees) and Climax state (larger shrubs, large trees). This process will also occur naturally as seeds from the neighbouring Sekhukhune Mountain Bushveld areas are introduced and germinate Certain tree species can be selectively introduced, however consideration will need to be given to rooting depths and soil stability as well as the ability of the trees to establish on the subject area							
		Riparian Habitat	Loss or Impact on NEFPA Sites	N	-1	-2	-1	-4	-8	No activities are planned within 500m from any NEFPA sites unless authorised. This restriction should be maintained.	N	-1	-1	-1	-1	-4	CbA
		Surface Water	Decommissioning activities may impact on the runoff and siltation of watercourses.	N	-3	-3	-3	-3	-12	No activities may take place within an agreed buffer (DWS to stipulate). Where the slopes have steep gradients due to the surrounding landscape measures should be implemented to assist with the trapping of seeds and to protect the crest from wind erosion If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the infrastructural areas must be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.	N	-2	-1	-1	-2	-6	CbA
		Groundwater	Contamination of groundwater resources.	N	-3	-3	-3	-3	-12	Monitoring of groundwater should continue until the rehabilitation activities associated with the new TSF have proven successful.	N	-2	-1	-1	-1	-5	CbA
		Heritage	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Socio-Economic	Unlawful and unscheduled access.	N	-3	-2	-4	-4	-13	Detailed contracts must be reviewed and implemented to avoid later disputes. These contracts	-	-2	-1	-1	5	1	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										should include the timing of activities and the people who will access the land.							
										All activities should remain within the approved contracts.							
										A list of contact people and responsible parties should be updated.							
Dismantling and decommissioning of infrastructure and buildings	2, 3 & 4	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	Removal of infrastructure may impact on the topography.	N	-2	-3	-4	-4	-13	Linear Infrastructure constructed by the mine will be removed if it proves to inhibit land use at decommissioning. Where possible infrastructure will remain for social investment opportunities, this will be decided in conjunction with the Integrated Development Plan of the area and the local authorities.	P	3	3	4	4	14	CbA
										Ensure the entire site remains fenced for the duration of rehabilitation.							
										Retain security access control to the site for the duration of rehabilitation.							
										All fixed assets that can be profitably removed will be removed for salvage or resale (the salvage and resale value have however not been incorporated into the closure cost estimate as per the legislative requirements)							
										All surface structures, infrastructure and 'hard surfaces' (inter alia, redundant surfaced roads, parking and paved areas) are to be demolished and removed from the disturbed mine footprint; unless an alternative/continued use for any such items is agreed upon, in writing, with the DMRE.							
										All surface infrastructure would be demolished and removed to a depth of 500mm. Any infrastructure below 500mm will be sealed, made safe and left in situ.							
										All fences erected around the infrastructure be dismantled and either disposed of at a permitted disposal site or sold off as scrap (provided that these structures will no longer be required by the post mining land owner). Fences erected to cordon off dangerous excavations will remain in place and will be maintained as and when required.							
										Water pollution control structures will remain until the completion of all demolition and associated rehabilitation activities where after these will be rehabilitated.							
		Soil, Land Use and Land Capability	Spills around the diesel and emulsion storage areas may result in the contamination of soils.	N	-1	-2	-4	-4	-11	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place	-	-1	-2	-1	-1	-5	-

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										not to compact new areas. Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately.							
			Contamination of soils as a result of a lack of sanitary services	N	-1	-2	-4	-4	-11	Chemical toilets must be readily available to contractors. Licensed companies must be appointed to remove any contaminated material and or wastes to licensed landfill sites.	-	-1	-2	-1	-1	-5	-
			Loss of soils due to decommissioning activities present on site.	N	-1	-2	-4	-4	-11	Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas. Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation. Undertake a Contaminated Land Assessment around areas used for diesel storage and supply to determine whether remediation of the areas is required. Implement a strict penalty fine system for rule breaking with regard to vehicular movement. Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.	N	-1	-2	-1	-1	-5	CbA
		Ecology	The establishment of Weeds and Invader Species.	N	-2	-3	-4	-4	-13	A weed eradication programme will be developed and implemented to eradicate weeds and invader plants and to prevent new invasions during the ongoing mining operation. Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas along the area which may be affected.	N	-1	-1	-2	-1	-5	CbA
			Unplanned loss of floral and faunal species of conservation importance.	N	-2	-4	-4	-4	-14	All employees, or contractors on site, involved in this project, should receive a detailed induction on the expectations for the protection of fauna and flora on site. No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine system will be developed for any person not complying. It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected	N	-2	-1	-1	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected							
			Accidental death of animals on the roads.	N	-2	-3	-2	-5	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes. A detailed induction programme will be in place to ensure that all parties are aware of the rules and regulations on site in terms of the use of roads. Vehicles may only travel on demarcated roads on site.	N	-1	-3	-1	-5	-10	CbA
		Riparian Habitat	Impact on wetlands and riparian habitats due to decommissioning activities.	N	-3	-2	-2	-3	-10	Remain at all times outside of the 1:100-year flood line of the watercourses where not authorised. Rehabilitation of affected freshwater resources must ensure that riparian structure and function are reinstated in such a way as to ensure the ongoing functionality of the larger drainage systems at pre-mining levels Ongoing Biodiversity Monitoring should be undertaken at the upstream and downstream points. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. The storm water management plans should be retained in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter the existing watercourses.	N	-1	-1	-1	-2	-5	CbA
		Hydrology	Erosion control over rehabilitated areas and the prevention of erosion gullies.	N	-1	-1	-4	-2	-8	The topography of all disturbed areas must be rehabilitated in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will reduce soil erosion and improve natural re-vegetation.	N	-1	-1	-2	-2	-6	CbA
			Contamination of surface water as a result of removal of infrastructure.	N	-2	-2	-4	-3	-11	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.	N	-1	-1	-2	-2	-6	CbA
			Rubble and waste from site could pollute local water resources.	N	-1	-1	-4	-2	-8	Waste that is not removed from site should be spread, covered and suitably rehabilitated.	N	-1	-1	-2	-2	-6	CbA
		Geohydrology	No direct impact	-	0	0	0	0	0	-	-	0	0	0	0	0	-
		Heritage	No direct impact	-	0	0	0	0	0	-	-	0	0	0	0	0	-
		Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an	N	-2	-2	-4	-3	-11	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul	N	-2	-1	-3	1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
			impact in terms of air quality and visual characteristics.							road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity. Establish and implement a dust suppression plan in consultation with the environmental control officer and an air quality specialist as part of the contractor's responsibility.							
		Air Quality	All activities associated with the removal of infrastructure and rehabilitation has the potential to release dust.	N	-2	-2	-4	1	-7	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.	N	-2	-1	-3	1	-5	CbA
		Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	N	-2	-2	-4	1	-7	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	N	-2	-1	-3	1	-5	CbA
		Social	Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	N	-2	-2	-4	1	-7	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	N	-2	-1	-3	1	-5	CbA
Earth Moving, shaping and ripping of ground	1, 2, 3, 4 & 5	Geology	No direct impact	-	0	0	0	0	0	-	-	-	-	-	-	-	-
		Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	P	1	3	4	5	13	Pre-mining topography should be reasonably restored through shaping and landscaping, such that the topography of rehabilitated areas will ultimately be commensurate with that of adjacent, non-disturbed areas. The final shaping should be viable to allow for potential agricultural activities and grazing opportunities post mining. If possible, ensure a continuation of the pre-mining surface drainage pattern.	-	1	3	5	5	14	-
		Soils	Soil erosion	N	-6	-3	-4	-3	-16	Re-vegetate as soon as possible	N	-2	-1	-3	1	-5	CbA
			Ripping and topsoil replacement will restore the soil physical characteristics prior to re-vegetation.	P	1	3	4	5	13	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation. Soil amelioration should be done according to soil analyses as recommended by a soil	P	1	3	5	5	14	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										specialist, to correct the pH and nutrition status before revegetation.							
										Where sites have been alienated of vegetation or where soils have been compacted or covered with concretes, these sites will be ripped and ploughed.							
										The topsoil and sub-soils with the appropriate seedbed as stripped during the construction and operational phases will be placed over these areas to a depth as specified by a qualified specialist. The topsoil shall be appropriately ameliorated to allow vegetation to grow rapidly if required – it should be noted that the mine will encourage self-succession of vegetation, if this does not take place effectively a re-vegetation project will be implemented							
		Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	P	1	2	3	4	10	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area should be ameliorated and seeded, should self-succession of vegetation not take place. Only species indigenous to the area will be included. Remove alien vegetation post decommissioning, with long term follow-up afterwards.	P	3	3	3	4	13	CbA
										On-going alien and invasive floral species control are required through all phases of rehabilitation.							
										If a reasonable assessment indicates that the re-establishment of vegetation is unacceptable slow, the soil needs to be analysed and any deleterious effects must be corrected and the area be seeded with a seed mix to specification							
										Access to rehabilitated areas should be restricted to vehicles/machinery specifically required for the implementation of the closure plan.							
		Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area is not free draining.	N	-2	-1	-3	1	-5	The areas will be landscaped to be free draining in line with the approved storm water management plan.	P	3	3	3	4	13	CbA
										Berms, should they be necessary, must remain upstream and downstream of the areas to ensure that clean water is kept separate from dirty water until the area is free draining and re-vegetation has occurred.							
		Geohydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	P	2	4	4	1	11	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	P	2	4	4	3	13	CbA
										Demarcate the decommissioning area and limit the decommissioning activities as far as possible.							

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										Final shaping will be implemented such that the final profile of the rehabilitated areas is formed to emulate natural contours of the area. Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated. All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site, or made available to the local community as building materials (provided they are in a satisfactory condition following demolition). Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning. All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.							
		Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.	N	-2	-2	-4	1	-7	Dust sampling will be undertaken on a monthly basis. Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist. In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	N	-2	-1	-3	1	-5	CbA
		Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	N	-2	-1	-4	3	-4	The removal of all infrastructure is to take place during daytime periods only. Where noise becomes a nuisance, management measures will be investigated and implemented to address these. Machinery with low noise levels and maintained in a good order to be used and to comply with the International Finance Corportion's (IFC) Health and Safety Regulations. Speed control measures will be implemented by the mine through the placement of adequate signage. Implement a penalty system for non-compliance to speed control measures and ensure that all workers are made aware of the penalty systems. Gravel roads to be maintained in as good and smooth a condition as possible.	N	-2	-1	-3	1	-5	CbA
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cessation of Labour Contracts	1, 2, 3, 4 & 5	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil, Land Use and Land Capability	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Terrestrial Ecology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
		(Fauna & Flora)															
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Hydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Geohydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Socio-Economic	Infrastructure areas could benefit the local community.	N	-3	-3	-4	-5	-15	Instead of demolition of certain areas, these areas could be sold off as commercial property for use in the local community. All surface structures, infrastructure and 'hard surfaces' (inter alia, redundant surfaced roads, parking and paved areas) are to be demolished and removed from the disturbed mine footprint; unless an alternative/continued use for any such items is agreed upon, in writing, with the DMRE.	P	3	3	4	4	14	CbA
			Loss of Employment.	N	-3	-3	-4	-5	-15	The mine should continue with the skills development programme and Social and Labour Plan commitments to empower the workforce to undertake other economically viable activities.	P	2	3	3	3	11	CbA
Waste Management and decommissioning of hazardous (also fuels) substances	1, 2, 3, 4 & 5	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil, Land Use and Land Capability	Spills around the diesel and emulsion handling areas and product stockpiles may result in the contamination of soils.	N	-1	-2	-4	-4	-11	Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately. A contaminated land assessment should be undertaken at all areas where diesel was stored, as well as where fuel pipelines were placed.	N	-1	-2	-1	-1	-5	R
		Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Groundwater	Handling or Hazardous Waste within workshops and general mine area.	N	-2	-2	-2	-4	-10	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas.	N	-1	-1	-2	-2	-6	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										Hazardous waste should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site.							
			Handling of Building Rubble	N	-2	-2	-2	-3	-9	All infrastructure will be removed and rehabilitated, should no alternative use be found for the structures. Foundations will be removed to a depth of 500cm below surface. All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible and as a last option be disposed of at a licensed facility suitable for such waste.	N	-1	-1	-2	-2	-6	CbA
			Handling and storing of Domestic Waste	N	-3	-3	-3	-3	-12	Clean and Dirty water separation systems should be maintained. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the site can be detected. Recycling practices must be investigated and implemented on site.	N	-2	-3	-2	-2	-9	CbA
		Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas. The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be implemented on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste and contaminated materials should be removed by a licenced removal company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal must be available on site. Weekly inspections of storm water management systems must be undertaken. Any blockages or maintenance requirements must be documented and an action plan developed.	N	-1	-1	-2	-2	-6	CbA
			Handling and storing of Domestic Waste should have no impact on the surface water resources due to the location of the facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.	N/A	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be maintained up until closure. Waste management training must be implemented on site. Weekly inspections of storm water management systems must be undertaken. Any blockages or	N	-1	-1	-2	-1	-5	CbA

Name of Activity	Project	Impact Area	Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	Significance before Mitigation	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	Significance after Mitigation	CvA/R/Ir
										maintenance requirements must be documented and an action plan developed.							
										Clear signs informing staff of waste management practices must be implemented on site.							
										Recycling practices must be investigated and implemented on site.							
										Building rubble must be disposed of in line with the requirements of the NEMWA.							
										Access control must be strictly enforced.							
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.h.vi.3 The Positive and Negative Impacts that the Proposed Activity (in terms of the Initial Site Layout) and Alternatives will have on the Environment and the Community that may be affected.

The proposed projects as part of this application are situated on the existing Dwarsrivier Mining Rights Area. Mining activities have been present in this area since the late 1990s.

1.h.vi.3.a Positive Impacts

The following key positive impacts are foreseen:

- The operation of the mine due to the lawful construction of the activities will allow the mine to operate within the legal realm of the Environmental Legislation;
- The construction of the various activities will ensure that the mining environment is safe and well designed to optimise the mining operations;
- The development of the TSF will allow for long-term ongoing mining and beneficiation activities;
- The activities mentioned above allow the mine to operate, invest in the local municipal setting, be a key employment supplier in the area, and participate as one of South Africa's chrome supply mines;
- The construction of an access point between the Plant and North Mine may lead to a reduction in traffic volumes on the regional road, as vehicles will utilise the more direct route; and
- The positive impacts for the residents and/or businesses within the area mainly in terms of potential short term employment creation during the construction phase, sustainable employment due to the continuation of the mining activities and local economic spin-offs.

With any activity where invasive tasks will take place, such as site clearance and constructions, negative impacts may arise. As part of this project various initial or potential impacts have been identified in Table 32 to Table 35. Specialist studies are currently underway to assess each of the project areas in detail to determine the possible impacts and associated management measures required. For the purpose of the Scoping Report, the current available information and the experience of the EAP were used to identify potential impacts and management measures.

1.h.vi.3.b Negative Impacts

The key potential negative impacts which may/will arise and for which management measures have been recommended are, but still require confirmation by specialists are:

<u>Geology</u>

- The potential of sterilising future mineral resources by the placement of the TSF and RWD.

<u>Topography</u>

- The TSF will alter the topography of the area permanently.

<u>Soils</u>

- Vegetation clearing within the proposed TSF areas as part of site preparation prior to commencement mining and related of activities, leading to soil disturbances and risk of erosion of exposed soils.
- Potential risk of soil erosion and disposal of waste on soil resources, leading to altered soil chemistry and quality.
- Contamination resulting from spillages of hydrocarbons and heavy metals.
- Movement of heavy machinery/ construction vehicles off existing/demarcated roads, leading to soil compaction.

<u>Ecology</u>

- Site clearing and construction activities will lead to habitat destruction within the footprint areas and will likely lead to the loss of floral and faunal species in the footprint areas, consequently impacting on the terrestrial biodiversity in the adjacent habitats.
- Vegetation clearance and constructions activities may result in the loss of faunal and floral SCC within the impacted areas.
- Potential indiscriminate fires by construction personnel may lead to uncontrolled/ run-away fires, impacting on floral and faunal communities.

- Construction and introduction of foreign material (e.g. soil) may lead to the further introduction of alien and invasive plant species, impacting on the floral characteristics within the natural areas remaining on the mine.
- Vehicles may impact upon the sensitive habitat during construction and operation, resulting in a loss of habitat. Vehicular movement and construction activities, could additionally cause increased erosion, leading to poor vegetation growth, consequently providing sub-optimal living conditions for faunal species.
- Dumping of construction and operational waste materials in the surrounding habitat will result in floral and faunal habitat changes, which is likely to push faunal species out of their current home ranges, resulting in an increased competition for space and resources in the areas surrounding the footprints.
- Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal and floral habitat. This is particularly relevant to Projects 3, 4 and 5 which are located in close proximity to the Springkaanspruit.
- Risk of discharge from the TSF facilities may pollute the receiving environment leading to altered floral and faunal habitat.
- Increased personnel on site may result in an increased risk of harvesting / overutilisation of medicinal and endangered floral species. Moreover, increased personnel inherently bring a higher risk of poaching activities, threatening the current faunal populations.
- Failure to update the Biodiversity Action Plan (BAP) and implement a rehabilitation and alien floral control plan:
    - Failure to update the BAP and control measures may lead to an increased loss of biodiversity within the mine and high rehabilitation cost at a later stage in the life cycle of the project;
    - Ineffective rehabilitation and monitoring of disturbed areas could lead to loss of species diversity;
    - Dust generated by ineffective rehabilitation of exposed areas may impact on the floral characteristics of the habitat surrounding the TSF; and
    - Ineffective removal of alien and invasive plant species, control of bush encroachers and rehabilitation of exposed areas could lead to re-establishment of invasive species, impacting on floral community rehabilitation efforts.

Freshwater Ecosystems

Several potential risks to the receiving environment by the proposed construction of the TSF and the diesel and emulsion batching areas have been identified and are presented in the bullets below:

- Possible total loss of a portion of important watercourse habitat within TSF Options C and D;
- Increased sedimentation and erosion of remaining portions of watercourses within the TSF site alternatives may result from altered run-off patterns. Increased sedimentation and erosion of watercourses situated within 500m of the proposed diesel and emulsion batching areas is possible due to the highly erodible and dispersive nature of soils in the region;
- Pollutants from construction activities (chemicals and hydrocarbons), runoff and spills during the operational phase and potential seepage from the TSF post-closure may contaminate nearby water resources and/or groundwater reserves;
- Similarly, pollutants from construction activities and possible fuel spillages during the operational phase of the batching areas may result in contamination of surface and/or groundwater; and
- Disturbances to the hydrological drivers of nearby watercourses may result from disturbances within their catchment areas, with specific mention of the loss of catchment yield due to the separation of clean and dirty water areas.

The extension of the Main Parking may result in the following impacts to the Springkaanspruit:

- Limited loss of riparian habitat (between 300m^2 and 330m^2 of riparian vegetation). The associated disturbance may lead to further proliferation of alien and invasive vegetation along the Springkaanspruit;
- Increased inputs of water to the Springkaanspruit in the form of stormwater runoff, leading to altered flood peaks and flow patterns; and
- Stormwater inputs may transport sediment and hydrocarbons into the Springkaanspruit, leading to altered water quality, which could in turn contribute to altered water quality within the downstream reach of the Groot Dwarsrivier.

No direct freshwater ecosystem impacts arising from proposed projects 4 and 5 (widening of the access road between the south shaft and Main Offices and access crossing between Plant and North Mine) are anticipated.

Indirect impacts may include increased dust generation in the vicinity of the Springkaanspruit, leading to increased sedimentation, smothering of biota and altered water quality.

Hydrology

- Erosion and consequent increase in Total Suspended Solids (TSS) in surrounding watercourses.
- The construction and placement of the TSF Options C and D within drainage lines will result in a loss of natural function and water quantity. It may further result in erosion and flooding if not diverted adequately around the TSF.
- Alteration in surface water drainage patterns leading to erosion and consequent increase in TSS in surrounding watercourses.
- Potential hydrocarbon spillages washed into downslope watercourses impacting water quality.
- The proposed TSF will be operated as a closed system to ensure that no dirty water reports to the environment. This will result in a loss of catchment area and water quantity for the Dwarsrivier.
- Seepage water from the TSF has the potential to migrate and daylight in downstream water resources.

Hydrogeology

- The presence of the alluvial aquifer associated with the Klein- and Groot Dwarsrivier relative to the TSF footprint area. This aquifer is formed by unconsolidated alluvium and is unconfined. It is therefore vulnerable to the impact of surface sources of potential contamination, like that associated with the proposed Khulu TSF.
- The presence of a preferential flow path with high permeability near or under the footprint of the proposed TSF. Such flow paths may be associated with faults and dykes, such as those identified by GAP (2018). It is noted that the current monitoring borehole drilling and aquifer testing underway as part of the Khulu TSF project is geared at characterising the perceived preferential flow paths to groundwater.
- Impact of the TSF and RWD on groundwater resources in terms of quality.

Air Quality

- Creation of a bare areas and the generation of dust.
- Predicted ambient PM10 and PM2.5 concentrations as a result of emissions from all proposed TSF Sites C and D are below the PM10 and PM2.5 NAAQS on a 24-hour and annual averaging period.
- Lowest predicted PM10 concentrations are anticipated at Site D with a maximum peak concentration of 10.31 µg/m³ and 2.06 µg/m³ on a 24-hour and annual averaging period.
- Lowest predicted PM2.5 concentrations are anticipated at Site D with a maximum peak concentration of 1.54 µg/m³ and 0.31 µg/m³ on a 24-hour and annual averaging period.
- Site D is located at the northern side of process plant which is adjacent to the existing TSF. Additionally, Site D is obstructed by the mountain 'koppie,' which is likely to reduce dust originating from the Site D.
- The predicted PM10 concentrations from Site B have a maximum peak concentration of 16.88 µg/m³ and 3.38 µg/m³ on a 24-hour and annual averaging period respectively. Site B predicted concentrations are lower than those predicted for Site C. Predicted PM2.5 concentrations at Site B have a maximum peak concentration of 2.53 µg/m³ and 0.51 µg/m³ on a 24-hour and annual averaging period respectively.

Visual Impacts

- The presence of the TSF in the landscape, changing the topographic and visual characteristics of the area.
- Additional night lighting from the TSF.
- Dust generation.

Heritage and Palaeontology

- The stone wall foundations of a ruin and a possible Early Iron Age site was recorded within Site B. The study area is however disturbed, possibly by previous cultivation reducing the significance of the recorded finds. The recorded sites will require limited mitigation.
- From a heritage point of view the heritage sensitivity associated with Site C is high due to the Iron Age sites recorded in the impact area and this option is therefore the least suitable for the proposed development.
- Site D is from a heritage point has previously been disturbed and no heritage resources were identified inside the footprint area of the proposed TSF. It should be noted that a cemetery occurs on the periphery of the site, and this area should be demarcated and avoided.

1.h.vi.4 The possible mitigation measures that could be applied and the level of risk.

As mentioned before, specialist studies are currently underway to assess each of the project areas in detail to determine the possible impacts and associated management measures required. For the purpose of the Scoping Report, the current available information and the experience of the EAP were used to identify potential impacts and management measures. Detailed mitigation measures and recommendations will be included in detail in the draft EIAR. The draft EIAR will take into account EAP and specialist findings.

Please refer to Table 32 to Table 35 for potential management measures which will be further assessed and confirmed by the specialist investigations. Some of the key management measures currently foreseen include:

- A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised.
- A copy of the WUL must be available on site at all times.
- Detailed contracts must be drafted to avoid later disputes. These contracts should include the timing of activities and the people who will access the land.
- Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts. Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.
- Vegetation clearance should be kept to an absolute minimum.
- Exposed areas should be vegetated as soon as possible.
- A storm water management plan must be designed and implemented that captures and contains dirty water runoff from the site, in accordance with the requirements stipulated in the GN704 Regulations. Dirty water captured, should be recycled and used at the plant, and should not be allowed to report to the environment. Standard measures should include upslope clean cut-off trenches to divert clean water around the TSF, as well as dirty water trenches and paddocks to capture runoff from the side slopes of the TSF. The walls around the top of the TSF should be of adequate size, and operation of the TSF pool water should be done to ensure that at all times there is sufficient freeboard of 0.8m, as required by GN704.
- General good housekeeping measures
    - The construction and operational footprints must be kept as small as possible to minimise impact on the surrounding environment;
    - Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste facility;
    - All soils compacted as a result of construction activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Special attention should be paid to alien and invasive plant control within these areas;
    - No indiscriminate disposal of waste should take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility; and
    - Upon completion of construction activities, it must be ensured that no bare areas remain and that indigenous floral species are reintroduced.
- Vehicle access
    - Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities;
    - Erosion and alien and invasive plant control need to be strictly managed in these areas;
    - It must be ensured that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; and
    - To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and storm water diversion away from areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous substances such as fuel and if any soils are contaminated, they should be stripped and disposed of at a registered hazardous waste disposal site.
- Rehabilitation
    - Topsoil should be removed as part of construction activities and placed on designated topsoil stockpiles for future rehabilitation;

- As much vegetation growth as possible should be promoted within the proposed development areas following construction activities to protect the soils. In this regard, special mention is made of the need to use indigenous vegetation species as the first choice during landscaping;
- All areas of disturbed and compacted soils need to be ripped and reprofiled; and
- All areas affected by mining activities should be rehabilitated upon closure of the mining and associated infrastructure areas. Areas should be reseeded with indigenous grasses as required. All rehabilitated areas should be rehabilitated to a point where natural processes will allow the pre-development ecological functioning and biodiversity of the area to be re-instated.

- Soil erosion and dust emission management
  - The footprint of the proposed TSF area should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible;
  - Bare soils can be regularly dampened with water to suppress dust, especially when strong wind conditions are predicted according to the local weather forecast; and
  - All disturbed areas adjacent to the TSF area can be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.
- Sedimentation and soil compaction management
  - All vehicular traffic should be restricted to the existing service roads and the selected road servitude as far as practically possible; and
  - Compacted soils adjacent to the mining blocks and associated infrastructure footprint can be lightly ripped to at least 25cm below ground surface to alleviate compaction prior to re-vegetation.
- Soil contamination management
  - Contamination prevention measures should be addressed in the EMP for the proposed projects, and this should be implemented and made available and accessible at all times to the contractors and construction crew conducting the works on site for reference;
  - Spill prevention and emergency spill response plans, as well as dust suppression and fire prevention plans should also be compiled to guide the construction works;
  - An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur, as well as preventative measures to prevent ingress; and
  - Burying of any waste including rubble, domestic waste, empty containers on the site should be strictly prohibited and all construction rubble waste must be removed to an approved disposal site.
- Loss of natural topography and drainage pattern management
  - The TSF area should be accessed through existing road network, where feasible to avoid unnecessary excavation;
  - Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible;
  - Stockpile should not exceed three (3) meters in height and should be treated with temporary soil stabilisation and erosion control measures;
  - Stockpiles should be revegetated to establish a vegetation cover as an erosion control measure. These stockpiles should also be kept alien vegetation free at all times to prevent loss of soil quality; and
  - Temporary berms can be installed, if necessary, around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion.
- Loss of land capability management
  - Direct surface disturbance of soils should be avoided where possible;
  - The footprint as well as areas affected by edge effect should be ripped to alleviate compaction;
  - Stored topsoil should be replaced (if any) and ameliorated according to soil chemical analysis; and
  - The recovered soils should be re-used to rehabilitate the mine footprint following mine closure.
- Floral and faunal SCC
  - If individuals or communities of these species will be disturbed by construction/operational activities, they must be relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint after obtaining the relevant permits from the LEDET or the DFFE;
  - The construction and operational footprints must be kept as small as possible in order to minimise impact on the surrounding environment;
  - Where site clearing takes place, it should be in a phased manner to allow for faunal species present to move out of the footprint area;

- Prior to any vegetation clearing activities taking place, an extensive assessment for floral and faunal SCC is to be undertaken within the proposed footprint areas. Where such species are located, notably floral SCC, the appropriate permits are to be obtained from the relevant authorities before any further work can be conducted;
- No trapping or hunting of any faunal species is to take place;
- No collection/ harvesting of floral medicinal plants or SCC is to take place;
- Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed;
- Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste facility;
- All soils compacted as a result of construction activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Special attention should be paid to alien and invasive plant control within these areas;
- No dumping of waste should take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility;
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous floral species are reintroduced; and
- Establishment of reintroduced vegetation must be monitored during the rehabilitation phase.

- Lining of the TSF and the RWD must take place to ensure that seepage of dirty water from the TSF into ground and surface water does not occur.
- Where possible activities must remain outside of the flood lines, where this is not possible, the required approval must be obtained from the DWS and activities should further be restrained to the dry season.
- Down lighting and lighting shields should be used as far as possible.
- Ensure that all design drawings include effective erosion control measures. This will specifically be important around the discharge point of fissure water (energy dissipaters must be included into the design).
- Equipment must be well maintained to reduce excessive noise creation.
- Ensure the required erosion protection measures are monitored and corrected where necessary.
- All workers must undergo an induction which includes environmental awareness training to make them aware of the environmental incident management procedures as well as the importance of complying with management measures.
- Tarpaulins will be placed over all vehicles transporting product.
- Water levels in the dams should be monitored and should be maintained at a 0.8m freeboard.
- Pipelines transporting fuels but be monitored in terms of volumes of water piped to the underground workings. Monitoring should be recorded on mine recording system (active at any time) to determine when there may be a potential leak on a pipeline.

Please refer to Table 32 to Table 35 for detailed lists and descriptions of all management measures currently foreseen.

1.h.vi.5 The outcome of the Site Selection Matrix, Final Site Layout Plan

The following figure presents the overall site layout, indicating all alternatives. Note that Site B is currently the preferred option.

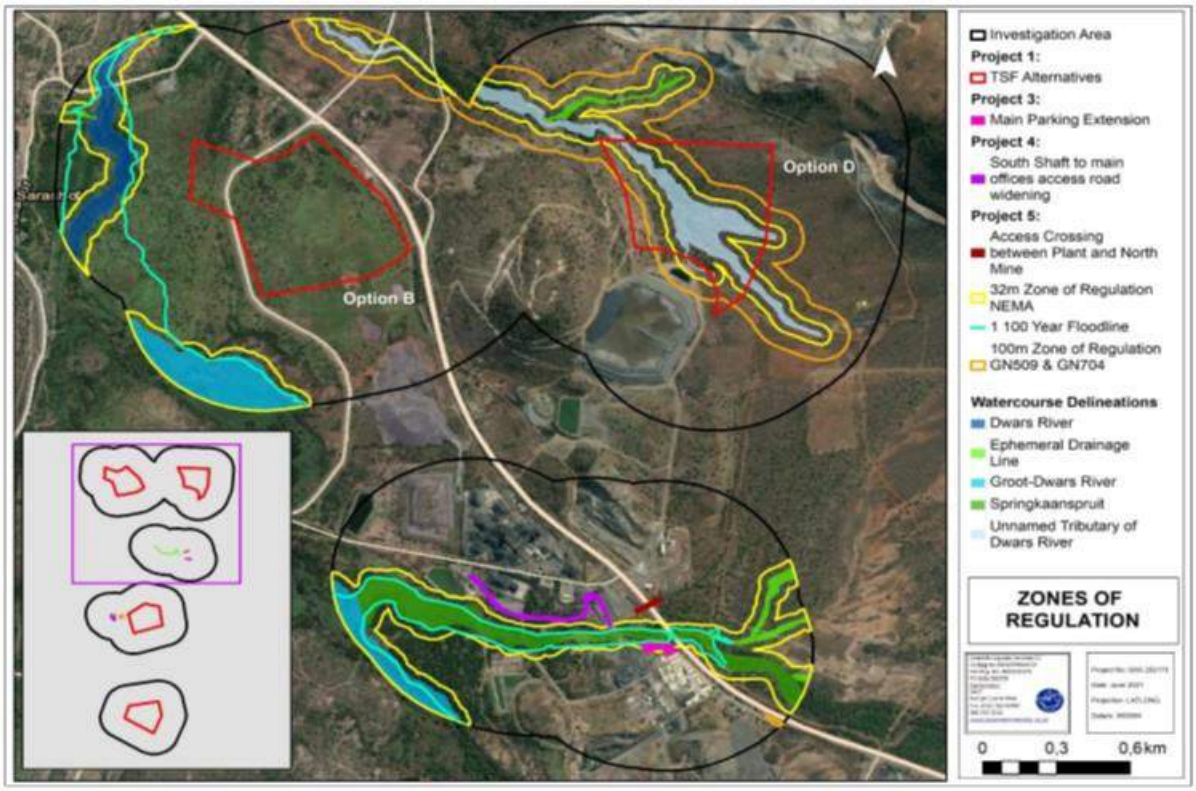


Figure 39: Option B, D, road widening, subway crossing, parking expansion Zones of Regulation

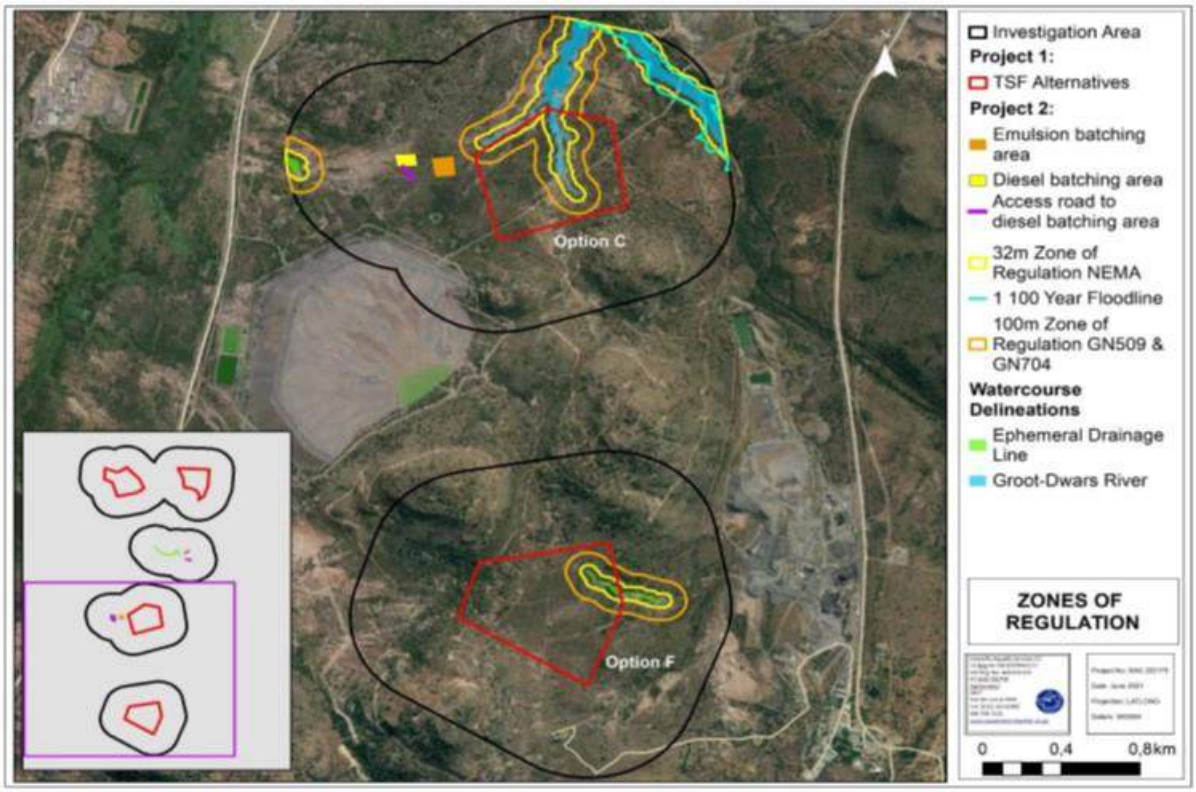


Figure 40: Option C, and previous Option F, with Diesel and Emulsion Batching areas Zones of Regulation

1.h.vi.6 Motivation where no alternatives sites exist

Not applicable.

1.h.vii Statement motivating the preferred site

Please refer to Section 1.h.i.1 of this report.

1.i Plan of Study for the Environmental Impact Assessment

1.i.i Description of alternatives to be considered including the option of not going ahead with the activity

Please refer to 1.h of this report which presents the views and options of relevant alternatives to the projects in question.

The only alternatives which will be assessed as part of the EIA Phase will be:

- Site alternative for the location of the TSF;
- Technological/ Activity Alternative (i.e. technology of disposal onto the TSF);
- No go alternatives (i.e. should the projects not be approved).

1.i.ii Description of the aspects to be assessed as part of the environmental impact assessment process

The aspects of the project that will be assessed in the EIA phase are those considered by the EAP as having the potential to result in environmental and social impacts. They include:

- Clearing of vegetation in an area regarded as sensitive;
- Proximity of activities to watercourses in the area;
- Removal of topsoil and the associated loss thereof in an area which has a negative topsoil balance;
- Impact on animals along the current open spaces;
- Visual impacts;
- Release of dust due to clearance activities; and
- Loss of heritage resources in an area not currently assess for this purpose.

The various projects which will therefore be considered will be the:

- Development of roads (permanent and temporary);
- Development and upgrade of infrastructure;
- Development and operation of the TSF;
- Development and operation of diesel storage and supply areas.

Detailed description of each of the activities are presented in Section 1.d.

1.i.iii Description of aspects to be assessed by specialists

Please refer to Annexure 5 for the current available views of specialists appointed for this project.

1.i.iii.1 Hydrogeology

1.i.iii.1.a Specialist Appointed:

Hydrogeology: iLEH (Pty) Ltd

1.i.iii.1.b Scope of Work for EIA

iLEH will complete the fieldwork phase in conjunction with Groundwater Abstract (GWA).

Proposed Fieldwork

The fieldwork proposed for the project, based on a limited understanding of the project and the available dataset, is as follows:

- Site visit and kick-off meeting should be undertaken by the fieldwork team to gain an understanding of the site layout and environmental risks. The meeting must be scheduled prior to initiation of any project activities and must be used to discuss project timelines, Health & Safety requirements and project deliverables.
- A ground geophysical survey should be conducted to delineate weathered zones and vertical to sub-vertical features within the area of the preferred option of the TSF, using magnetic and electromagnetic (EM34-3) surveying methods. This should be done to assess deeper weathered material across the area and identify linear geological structures that could potentially act as preferred groundwater flow paths. The drilling programme should be supported by the geophysical survey to help identify suitable drilling targets. For the purpose of the proposal, two days have been included to complete the geophysical survey. This will be confirmed upon completion of the Scoping Phase of the project.
- A hydrocensus should be conducted within and around the preferred TSF site; covering a radius of approximately 3km. For the purpose of the proposal, it is assumed that during the hydrocensus groundwater samples will be collected from 5 sample sites (groundwater and surface water). The survey is important, not only to identify existing boreholes in an area, but also to determine their status, use, water quality and water table depth. This data serves as baseline information and as reference for future claims, identification of sensitive receptors and as reference during impact assessments. On site water quality parameters must be recorded using handheld instruments and recorded on a field sheet. For the purpose of the proposal, 2 days have been included to undertake the hydrocensus.
- A drilling programme will be required to determine the aquifer characteristics in the vicinity of the preferred option for the TSF and define possible linear geological features or geological contacts that could act as preferred groundwater flow paths. The data is used in support of the conceptual and numerical model associated with the project. Once the study is completed, the boreholes can be used for monitoring purposes. For the purpose of the proposal, it is assumed that GWA will supervise the drilling programme and assist the client to find a competent drilling team. It is recommended that the drilling programme is performed using the rotary air percussion method with initial drilling performed at a diameter of 177mm inner diameter (ID) and reamed or enlarged to 203mm if high yielding boreholes are intercepted. Data collection must include measurement of depth, penetration rate, water level and water quality. Three sets of DCM paired monitoring boreholes are proposed for the preferred site of the TSF. The deeper boreholes must be at least 50m deep and the shallow boreholes 15m. This configuration will allow for the monitoring of both shallow and deep aquifers. Six monitoring boreholes are thus proposed near the proposed TSF. The method of construction for the monitoring boreholes is based on previous experience of drilling in similar lithologies to similar depths. Boreholes must be fitted with 165mm inner diameter steel casing; perforated casing over the full length of the shallow boreholes and 30m casing for the 50m deep boreholes. Monitoring boreholes are often 5-inch diameter or smaller, but that limits the project to conduct effective aquifer testing and limits the client in terms of future sampling or water abstraction activities. It has been assumed that the drilling programme can be completed within 5 days.
- It is recommended that aquifer tests be completed on the 3 deeper boreholes proposed at the preferred alternative of the TSF to determine aquifer yields and to calculate the parameters presenting the aquifer hydro-dynamics underlying the investigation area. A step drawdown test followed by a constant discharge and recovery test are planned. Each borehole should be pump tested for 8 hours followed by 8-hour recovery measurements. Groundwater samples must be collected from all boreholes for quality analysis.

Geohydrological Impact Assessment

The Dwarsrivier Mine groundwater model was updated and recalibrated during 2018 by iLEH with the latest monitoring dataset. No further calibration will therefore be required as part of this assessment. This updated model can be used to complete impact prediction simulations for the proposed new TSF.

The proposed simulations include:

- Assessing the operational and long-term impact of the proposed new TSF and its associated infrastructure on groundwater quality in the alluvial, weathered and fractured rock aquifers.
- Assessing the impact of various TSF design and management options, including the location, footprint area and liner options.

- Assessing the impact of the new TSF on the sensitive receptors and the receiving water bodies present in each area. Based on the information made available to compile this proposal, it is evident that no monitoring boreholes are present at the proposed TSF sites. In order to complete the modelling with confidence, the fieldwork proposed above should be completed prior to the modelling proposed below. This information can be used to update the conceptual and numerical models, based on the presence of fractures, faults and intrusions.

Waste Classification of the new TSF

- No tailings material will be available for the new TSF at the time of compilation of the waste classification report. It is assumed that tailings from the existing Northern TSF will be similar to that which will be deposited at the proposed new TSF. A waste classification study was completed in 2015 for the Northern TSF. It is proposed that the data from this study is used to compile a waste classification report for the proposed new TSF, on the assumption that it will be the same material that will be placed on the new TSF.

1.i.iii.2 Visual

1.i.iii.2.a Specialist Appointed:

Visual: Hydrospatial

1.i.iii.2.b Scope of Work for EIA

The aim of the study will be to identify the visual impacts of the proposed project on the surrounding environment. The following are objectives of the Visual Impact Assessment (VIA):

- Examine aerial photography available for the project area and surrounds;
- Create and analyse topographical, slope intensity and slope aspect models in ArcGIS 3D Analyst Extension;
- Create and analyse viewshed models in ArcGIS 3D Analyst Extension for daytime and night-time scenarios;
- Visit the project area to verify these models;
- Describe the visual/aesthetic character of the receiving environment;
- Describe the current and post development visual aspects of the project area;
- Identify sensitive visual receptors and key public viewpoints that will be impacted on by the proposed project, taking into account visibility aspects;
- Identify the impacts, pre- and post-mitigation that the proposed infrastructure will have on the visual landscape, by rating the scale, duration, severity and probability of the impacts occurring; and
- Provide mitigation/management actions and recommendations in an attempt to reduce the potential visual impacts.

The following will be undertaken in order to complete the VIA:

Desktop assessment

A VIA is a specialist study performed to identify the visual impacts of a proposed project on the surrounding environment. The project will be investigated in terms of the visual characteristics of the receiving environment.

At a desktop level, aerial photography will be analysed to characterise the landscape. A Digital Elevation Model (DEM) will be created using ArcGIS 3D Analyst Extension, with contour and point relief data as input. The resultant DEM will be used to create slope and aspect models.

The DEM will then be used as an input to create a viewshed model using ArcGIS 3D Analyst Extension; this will be done to establish the degree of visibility that the proposed TSF is likely to have. Information gathered during the site visit will be used to determine the zone of influence and refine the viewshed model for daytime and night-time scenarios.

Site Visit and Baseline Data Collection

Photographs will be taken during a site visit and topographical features (natural and man-made), overall visual resources, the variety of landscape characters, and sense of place attributes will be assessed. Visual Impact

The "Guideline for involving visual and aesthetic specialists in EIA processes" document by Oberholzer (2005) will be used as a best practice guideline for the VIA. Although these guidelines were developed for the Western Cape province of South Africa they are relevant for this VIA as "the guidelines promote the principles of EIA best practice without being tied to specific legislated national or provincial EIA terms and requirements" (Oberholzer, 2005).

Impact Assessment

The impact assessment will identify the impacts, pre- and post-mitigation that the proposed project will have on the visual landscape, by rating the scale, duration, severity and probability of the impacts occurring. The current and post development visual aspects of the project area will be described in a specialist report. Mitigation measures and recommendations will be provided in an attempt to reduce the potential visual impacts.

1.i.iii.3 Air quality

1.i.iii.3.a Specialist Appointed:

Air Quality: WSP (Pty) Ltd

1.i.iii.3.b Scope of Work for EIA

Baseline Assessment

In order to contextualise the study, a baseline assessment will be conducted comprising the following:

- Review of the potential health effects associated with atmospheric emissions from the existing mine and proposed TSF;
- Identification of neighbouring sensitive receptors, including adjacent communities and residential areas;
- Identification of any neighbouring sources. Emissions from these sources will not be included into the dispersion model, but a discussion on how they may contribute to the cumulative air quality conditions will be included;
- Assessment of baseline conditions at the proposed site including:
- Existing air quality conditions through the analysis of ambient air quality monitoring data; and
- Meteorological conditions with the use of three years data procured from the nearest local South African Weather Services (SAWS) weather station and the purchase of three years MM5 prognostic data (required for AERMOD) for the period January 2015 - December 2017.
- Review of applicable air quality legislation including the Listed Activities and Associated Minimum Emission Standards (MES, GNR 893, 22 November 2013) and the National Ambient Air Quality Standards (GNR 1210, 24 December 2009 and GNR 486, 29 June 2012).

Emissions Inventory

The emissions inventory will account for all significant releases to atmosphere in the form of point, line and area (fugitive) sources. Emissions will be calculated using the United States Environmental Protection Agency's (EPA) AP42 emission factors. The AP42 emission factors have been compiled since 1972 and contain emission factors and process information for over 200 air pollution source categories. Where AP42 emission factors are not available, emission factors from the Australian National Pollution Inventory (NPI) will be utilised.

A detailed emissions inventory will be compiled to assess emissions associated with the current mine activities as well as the proposed TSF. On completion of the emissions inventory, the inventory will be submitted to the client for approval before any dispersion modelling commences.

Please note: the specialist will provide the Client with a detailed list of required information to compile the emissions inventory. The specialist cannot be held responsible for project delays due to the receipt of insufficient or inaccurate information. Changes to the emissions inventory after dispersion modelling commences will result in additional costs to the Client.

Dispersion Modelling

The AERMOD dispersion modelling platform will be utilized to assess the dispersion of pollutants from the existing mine and proposed TSF. AERMOD is a recommended Level Two dispersion model as per the South African Regulations Regarding Air Dispersion Modelling (GNR 533, 11 July 2014), and is typically recommended for impacts that are in the order of a few kilometres downwind (<50 km).

The AERMOD software is well equipped to simulate the dispersion of emissions from the facility and has the following capabilities:

- It is a new generation air dispersion model designed for short-range dispersion (<50 km) of airborne pollutants in steady state plumes;
- It incorporates air dispersion based on boundary layer turbulence structure and scaling, including treatment of both surface and elevated sources and both simple and complex terrain; and
- It uses hourly sequential meteorological files with pre-processors to generate flow and stability regimes for each hour that cumulatively offer long-term ambient concentrations whilst also capturing short-term peaks.

The following dispersion modelling scenarios will be assessed:

- Incremental impacts associated with the existing mine and proposed TSF; and
- Cumulative impacts associated with the existing mine and proposed TSF together with existing ambient concentrations in the surrounding area, if data is available. Please note: a detailed emissions inventory will not be compiled for surrounding existing sources.

Air Quality Impact Assessment Report

On completion of the dispersion modelling, a detailed Air Quality Impact Assessment will be compiled presenting the baseline assessment, emissions inventory, dispersion modelling predictions, associated impacts and recommendations to reduce emissions from site (if deemed necessary). The results will be assessed against the relevant South African National Ambient Air Quality Standards. The report will be structured ensuring alignment with the Regulations Regarding Air Dispersion Modelling (GNR 533, 11 July 2014).

Please take note of the following exclusions:

- Baseline and meteorological monitoring;
- Additional client meetings or site visits – one site visit/walkover has been budgeted for;
- Submission of emissions data onto the National Atmospheric Emissions Inventory System (NAEIS);
- Authority meetings.

Level 3 dispersion modelling. Should the authority require a more complex model (e.g. CALPUFF), the additional costs will be for the account of the Client. Based on WSP's experience, a Level 2 (AERMOD) model will suffice for a project of this magnitude.

1.i.iii.4 Socio-Economic

1.i.iii.4.a Specialist Appointed:

Socio Economic Assessment: Batho Earth

1.i.iii.4.b Scope of Work for EIA

A detailed Social Impact Assessment with regards to the preferred site location will be undertaken during Phase two of the process to:

- Project and estimate potential positive and negative social impacts associated with the proposed tailings facility;
- Project and estimate how the economic impacts associated with the project would impact on the social environment within the study area;
- Determine indirect and cumulative impacts;
- Rate the anticipated impacts based on rating criteria;
- Propose mitigation measures to limit the negative impacts and enhance the positive impacts.

The methodology recommended include:

- A site visit to the area will be undertaken.
- Desktop research will be undertaken with regards to the socio-economic characteristics of the receiving environment.
- A baseline profile of the receiving environment will be compiled.

- A Scoping Report will be finalised that would note and assess the potential socio-economic impacts associated with the different site locations.
- During the EIA Phase, the anticipated socio-economic impacts of the proposed new infrastructure development (tailings facility) on a preferred site will be assessed.
- Consultation would link with the public participation process and will be undertaken with regards to the preferred site.
- Data received will be studied and analysed to assess the impact of the proposed tailings facility on the direct (surrounding communities) and indirect (regional) environment.

1.i.iii.5 Hydrology

1.i.iii.5.a Specialist Appointed:

Storm Water Management: Hydrospatial (Pty) Ltd

1.i.iii.5.b Scope of Work for EIA

The following scope of work will be undertaken:

- A hydrological assessment will be undertaken to determine the 1:50 and 1:100 year peak flows. Long term streamflow's from gauging stations within close proximity to the proposed facility will be assessed. In addition to this, the peak flows will be calculated using a peak flow method such as the Rational, SCS, SDF or Unit Hydrograph method.
- Provide recommendations for storm water management for the activities proposed. The report will also include plans indicating the proposed conceptual SWMP. It is proposed that the study will be undertaken on a desktop level and that no site visit will be required. The topography of the site will be studied from the Mines survey data (if available) and from the 1:50 000 topographical data for South Africa. The proposed activities will be overlaid on top of the topography to provide an understanding of the surface water flows at the site, and how this will impact on these activities and the environment. The storm rainfall depths will be obtained from the Smithers and Schulze database for the site, and catchments will be delineated to obtain an understanding of the expected runoff volumes that would need to be dealt with. Conceptual placement of proposed storm water infrastructure will be provided, and will as far as possible tie into the existing SWMP, to ensure that there is minimal impact to the environment.

1.i.iii.6 Heritage and Palaeontology

1.i.iii.6.a Specialist Appointed:

Heritage Contracts and Archaeological Consulting CC (HCAC).

1.i.iii.6.b Scope of Work for EIA

HCAC was contracted by EnviroGistics to conduct a heritage study at the mine.

The aim of the scoping report is to conduct a desktop study to identify possible heritage resources within the project site. The study furthermore aims to assess the impact of the proposed project on non - renewable heritage resources and to submit appropriate recommendations with regards to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve and develop them within the framework provided by Heritage legislation.

The assessment is to be undertaken in two phases, a desktop study (scoping phase) and a field-based assessment (Heritage Impact Assessment). This report concerns the scoping phase. The aim of the scoping phase is to cover available data regarding archaeological and cultural heritage to compile a background history of the study area in order to identify possible heritage issues or fatal flaws that could possibly be associated with the project and should be avoided during development.

- Literature review

A review was conducted utilising data for information gathering from a range of sources on the archaeology and history of the area. The aim of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves of the area.

- Information collection

The South African Heritage Resources Information System (SAHRIS) was consulted to further collect data from CRM practitioners who undertook work in the area to provide the most comprehensive account of the history of the area where possible. In addition, the archaeological database housed at the University of the Witwatersrand was consulted.

- Public consultation

Consultation as part of the overall EIA Project.

- Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

- Genealogical Society of South Africa

The database of the genealogical society was consulted to collect data on any known graves in the area.

- Restrictions

This study did not assess the impact on intangible resources or the palaeontological component of the project. Based on available data and resources as outlined in the report additional information that becomes available at a later stage might change the outcome of the assessment.

Based on current available information, there it is possible to determine the probability of finding archaeological and cultural heritage sites within the study area to a certain degree. For the purposes of this section of the report the following terms are used – low, medium and high probability. Low probability indicates that no known occurrences of sites have been found previously in the general study area. Medium probability indicates some known occurrences in the general study area are documented and can therefore be expected in the study area. A high probability indicates that occurrences have been documented close to or in the study area and that the environment of the study area has a high degree of probability for the occurrence of sites.

- Archaeological and Cultural Heritage Landscape

NOTE: Archaeology is the study of human material and remains (by definition) and is not restricted in any formal way as being below the ground surface.

Archaeological remains dating to the following periods can be expected within the study areas:

- Stone Age finds

ESA: Low Probability

MSA: Medium Probability

LSA: Medium Probability

LSA –Herder: Low Probability

Shell Middens – No Probability.

- Iron Age finds

EIA: Medium Probability

MIA: Medium to high Probability

LIA: Medium to high Probability

- Historical finds

Historical period: Low-Medium Probability

Historical dumps: Low-Medium Probability

Structural remains: Low-Medium Probability

- Living Heritage

For example, rainmaking sites: Low Probability

- Burial/Cemeteries

Burials over 100 years: Medium Probability

Burials younger than 60 years: Medium Probability

Subsurface excavations including ground levelling, landscaping, and foundation preparation can expose any number of these resources.

Based on the current information and with cognisance of the recorded archaeological sites in the wider area and in order to comply with the National Heritage Resources Act (Act 25 of 1999) it is recommended that a field-based assessment should be conducted. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study, the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

1.i.iii.7 Soils and Land Capability

1.i.iii.7.a Specialist Appointed:

Scientific Aquatic Services CC

1.i.iii.7.b Scope of Work for EIA

Agricultural potential is directly related to Land Capability Class (LCC), measured on a scale of I to VIII, with classes I to III considered as prime agricultural soils, and classes V to VIII not suitable for cultivation. High potential agricultural land is defined as having "*the soil and terrain quality, growing season and adequate available moisture supply to sustain crop production when treated and managed according to best possible farming practices*" (Land Capability report, ARC, 2006). High agricultural potential land is a scarce non-renewable resource, which necessitates an Agricultural Potential assessment prior to land development, particularly for purposes other than agricultural land use, as per Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA).

The scoping phase of the soil and land capability assessment entailed the following aspects:

- A desktop review of existing land type maps, to establish broad baseline conditions and areas of environmental sensitivity and sensitive agricultural areas;
- Assess spatial distribution of various soil types within the study area;
- Identify restrictive soil properties on land capability under prevailing conditions;
- Compile various maps depicting the on-site conditions based on desktop review of existing data;
- A soil classification survey will be conducted within the study area and corridor of the proposed pipeline;
- Subsurface soil observations and sampling will be made by means of a manual bucket hand auger;
- Classify the dominant soil types according to the South African Soil Classification System (Soil Classification Working Group, 1991);
- Compile a report presenting the results of the desktop study and a brief description of the findings during the field assessment; and
- Present the plan of study for the EIA phase of the project including the methods of assessment to be used.

The scope of work and specific outcomes in terms of the EIA Phase report are presented in the points below:

- Review and identify broad soil patterns and land capability data within the investigated project areas on the Agricultural Geo-referenced Information System (AGIS) and/or Agricultural Research Council Institute for Soil Climate and Water (ARC-ISCW) databases;
- A soil classification survey will be conducted within the study area and corridor of the proposed pipeline;
- Subsurface soil observations and sampling will be made by means of a manual bucket hand auger;
- Classify the dominant soil types according to the South African Soil Classification System (Soil Classification Working Group, 1991);
- Record the assessed survey and sampling points on a Global Positioning System (GPS);
- Provide description of physical soil properties including the following parameters:
    - Terrain morphological unit (landscape position) description;
    - Diagnostic soil horizons and their respective sequence;
    - Texture, estimated as % clay according to the in-situ hand feel method;
    - Depth of identified soil horizons;
    - Soil form classification name(s);

- Observed land capability limitations of the identified soil forms; and
- Depth to saturation (water table), if encountered.

- Group uniform soil patterns into map units, according to observed limitations;
- Analyse and interpret soil analysis data to assess the contamination risk / impacts under current conditions; and
- Provide recommended mitigation measures and management practices to implement in order to comply with applicable legislations.

1.i.iii.8 Terrestrial

1.i.iii.8.a Specialist Appointed:

Scientific Aquatic Services CC

1.i.iii.8.b Scope of Work for EIA

The scope of work will include the following:

- To conduct a Species of Conservational Concern (SCC) assessment, including potential for species to occur within the areas of the proposed expansion;
- To provide faunal and floral inventories of species as encountered on site;
- To determine and describe faunal and floral habitats, communities and ecological state within the areas of the proposed expansion;
- To describe the spatial significance of the expansion areas with regards to surrounding natural areas;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/or any other special features; and
- To identify anticipated environmental impacts of the proposed mine expansion activities on the terrestrial ecology.

1.i.iii.9 Aquatic and Wetland Systems

1.i.iii.9.a Specialist Appointed:

Scientific Aquatic Services CC

1.i.iii.9.b Scope of Work for EIA

To identify all potential freshwater resources that may potentially be impacted by the proposed mining expansion, a 500m "zone of investigation" around the MRA, in accordance with Regulation 509 of 2016 as it relates to the National Water Act (NWA), was used as a guide in which to assess possible sensitivities of the receiving environment.

The following points highlight the envisaged activities during the impact assessment phase of the project:

- Freshwater resources will be delineated during the field assessment according to "DWAF, 2008 (draft): A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Aspects such as soil morphological characteristics, vegetation types and wetness will be used to delineate the various zones of wetness (permanent and temporary) according to the guidelines. Buffer zones will then be allocated to the freshwater resources;
- All freshwater resources within 500m of the MRA delineated on a desktop basis in accordance with GN 509 of 2016 as it pertains to the National Water Act, 1998 (Act 36 of 1998);
- The classification assessment of the freshwater resources will be undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis et al., 2013);
- The EIS of the freshwater resources will be determined according to the method described by Rountree & Kotze, (2013);
- The services provided by the freshwater resources within the MRA will be assessed according to the method of Kotze et al (2009) in which services to the ecology of the site as well as services to the people of the area were defined;

- The Present Ecological State (PES) of the freshwater resources will be assessed according to the resource directed measures guideline as advocated by Macfarlane et al., (2008) and DWAF (2007), as applicable to each freshwater resource;
- Freshwater resource areas will be mapped according to the ecological sensitivity of each hydrogeomorphic unit in relation to the MRA. In addition to the freshwater resource boundaries, buffers will be generated and the applicable zone of regulation of 100m in terms of Regulation GN704 and 500m in terms of GN 509 of the NWA, will be depicted where applicable;
- The PES, EIS, and ecological service provision of the freshwater resources will be highlighted, and expected impacts on the systems will be assessed according to the impact assessment methodology;
- The aquatic ecological assessment will be undertaken by utilising the historical data from the existing biomonitoring program to define the Ecostatus as well as the Ecological Importance and Sensitivity (EIS) of the Groot Dwarsrivier and the Klein Dwarsrivier, and
- Impacts predicted to occur will be assessed according to a pre-defined impact assessment methodology.

1.i.iv The proposed method of assessing duration significance

Please refer to Section 1.h.vi.1 presenting the methodology to be used in the determination of the significance of the impacts.

1.i.v Proposed method of assessing the environmental aspects including the proposed method of assessing alternatives

Please refer to Section 1.h.vi.1 presenting the methodology to be used in the determination of the significance of the impacts.

1.i.vi The stages at which the competent authority will be consulted

The commenting authorities have been notified of the proposed project via notification letters (Background Information Documents – please refer to Annexure 4. The documents provided high level project information with a reference to the project.

Commenting authorities will receive hard copies the draft Scoping Report and will receive hard copies of the draft EIA Report.

All comments received from the authorities will be provided to the DMRE for considerations.

The EAP will arrange an authority meeting with the DMRE and DWS.

1.i.vii Particulars of the public participation process with regard to the Impact Assessment process that will be conducted

1.i.vii.1 Steps to be undertaken to notify interested and affected parties

In accordance with the NEMA, GNR 982, Chapter 6, potential I&APs either have been or will be notified of the proposed project using the following means:

- Fixing a notice board in conspicuous areas around the proposed project site.

Written notice to the:

- Land owner of the site where the activity to which the application relates to;
- The current occupier of the land;
- Municipal ward councillor(s) related to the project site;
- Municipality which has jurisdiction in the area; and
- Commenting authorities.

Placing an advertisement in a local newspaper.

Please refer to Annexure 4 for more detail in this regard.

1.i.vii.2 Details of the engagement process to be followed

Please refer to Section 1.h.iv and Annexure 4 for more detail in this regard. A follow up meeting with the Two Rivers Platinum Mine will be undertaken as part of the draft EIA Phase.

1.i.vii.3 Description of the information to be provided to Interested and Affected Parties

During the initial stakeholder notification process, high level project detail will be provided including location of the project, boundary of the proposed project site, farm details, land use information, legal triggers and proposed way forward.

During the draft ESR, public review period (23 July 2021 to 23 August 2021), comments will be received from stakeholders. These comments will be included into the Final ESR and will be address in further detail during the EIA Phase.

During the scoping phase the stakeholders obtained information regarding the:

- Site Plans;
- Alternatives;
- A description of activities and operations to be undertaken;
- Baseline information;
- Specialist studies to be undertaken; and
- Proposed impact assessment methods.

During the EIR Phase, the following information will be disclosed in the EIA Report:

- Impact assessment undertaken and results thereof;
- Management measures;
- Monitoring plans; and
- Closure objectives.

1.i.viii Description of the tasks that will be undertaken during the environmental impacts assessment process

Once the Final Scoping Report has been submitted to and accepted by the DMRE, the proposed project will proceed into the detailed EIA Phase, which involves the detailed specialist investigations (as described in earlier sections of this report).

The EAP will produce a Draft EIA Report after the completion of the required specialist studies. The Draft EIA Report will provide an assessment of all the identified key issues and associated impacts from the Scoping phase. All requirements as contemplated in the 2017 EIA Regulations will be included in the Draft EIAR.

1.i.ix 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

Please refer to Sections 1.h.vi.2, 1.h.vi.3, and 1.h.vi.4 for a detailed description of the potential impacts and management measures.

1.j Other Information required by the Competent Authority

None identified at this time.

1.j.i Compliance with the provisions of sections 24(4) (a) and (b) red with section 24(3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). The EIA report must include the:-

1.j.ii Impact on the socio-economic conditions of any directly affected person

No negative impact, which cannot be managed has been identified to date. The project will allow for the long term continuation of the mining and beneficiation activities on site. In addition to this the project will allow for

the improvement and formalisation of existing activities on site, which will enhance safety and environmental management on site.

1.j.iii Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

A Scoping Assessment has been completed for the proposed project. The current area of impact is listed below and will be further assessed during the EIA phase:

- The stone wall foundations of a ruin and a possible Early Iron Age site was recorded within Site B. The study area is however disturbed, possibly by previous cultivation reducing the significance of the recorded finds. The recorded sites will require limited mitigation.
- From a heritage point of view the heritage sensitivity associated with Site C is high due to the Iron Age sites recorded in the impact area and this option is therefore the least suitable for the proposed development.
- Site D is from a heritage point has previously been disturbed and no heritage resources were identified inside the footprint area of the proposed TSF. It should be noted that a cemetery occurs on the periphery of the site, and this area should be demarcated and avoided.

1.k Other matter required in terms of sections 24(4) (a) and (b) of the Act.

None applicable.

2 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

The EAP herewith confirms:

2.a The correctness of the Information provided in the Reports

2.b The inclusion of Comments and Inputs from Stakeholders and I&APs

2.c The inclusion of Inputs and Recommendations from the Specialist Reports where relevant

2.d That the Information provided by the EAP to I&APs and any Responses by the EAP to Comments and Inputs made by I&AP are correctly reflected herein

Signature of the Environmental Assessment Practitioner

EnviroGistics (Pty) Ltd

Name of company

22 July 2021

Date

3 UNDERTAKING REGARDING LEVEL OF AGREEMENT

To be signed upon the final ESR.

Undertaking by the client:

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of sections 29 and 39 (5) in that regard, and the applicant undertakes to execute the Environmental management plan as proposed.

Full Names and Surname

Identity Number

Designation

Signature

Date

Annexures

Annexure 1: DMR Acknowledgment of Receipt

Annexure 2: EAP Curriculum Vitae

Annexure 3: Title Deeds

Annexure 4: Stakeholder Consultation Records

Annexure 5: Site Selection Report, with specialist studies

Annexure 1: DMR Acknowledgement of Receipt

Annexure 2: EAP Curriculum Vitae

Annexure 3: Title Deeds

Annexure 4: Stakeholder Consultation Records

Annexure 5: Site Selection Report and Specialist Studies