Dwarsrivier Chrome Mine (Pty) Ltd

DRAFT Environmental Impact Assessment for the establishment of various Capital Projects, Diesel Storage (including decommissioning of existing facilities), as well as the expansion of the exploration programme

Report Purpose

Draft EIA Report for Stakeholder Review

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Report Author

Tanja Bekker
MSc. Environmental Management
Certified EAPSA; SACNASP Reg. 400198/09

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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 Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Body of the Environmental Assessment Practitioners of South Africa (EAPSA), 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 14 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.

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Michelle Pretorius	Internal Review	26 July 2018	Electronic
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Executive Summary

Introduction

Dwarsrivier Chrome Mine (hereafter referred to as "Dwarsrivier Mine" or "the 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) and Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grootteboom 373KT.

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

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

- Project 1: Resource and Reserve Drilling which includes the construction of roads, 'drilling pads' and the clearance of vegetation;
- Project 2: The development of a number of Capital Projects, including a new Metallurgical Low-Grade Product Stockpile area, the expansion of the existing Topsoil Stockpile area at South Mine, development of a Truck Parking Area, development of a laydown area, establishment of a reservoir and the expansion of the North Shaft Infrastructure (new change house, pipelines supplying diesel to underground operations, etc.);
- Project 3: Diesel Storage which entails the decommissioning of existing tanks and the establishment of new facilities (total capacity of 295m^3); and
- *Project 4: Discharge of water. The mine intends to discharge fissure water captured in the underground workings into the Groot Dwarsrivier. NOTE THAT THIS PROJECT HAS BEEN EXCLUDED FROM THE ENVIRONMENTAL AUTHORISATION APPLICATION PROCESS PENDING FURTHER SPECIALIST INVESTIGATIONS.*

Project Description

Project 1: Resource and Reserve Drilling

As exploration is a dynamic process as part of the operational phase of Dwarsrivier Mine, an exploration programme has been developed to consider the possible area over a period of five (5) years. It is planned that exploration drilling will take place at the following areas:

- Farm Dwarsrivier 372KT Portion 0: Exploration Drilling (access roads and approximately 24 drill pads);
- Farm Dwarsrivier 372KT Remainder of Portion 1: Exploration Drilling (access roads and approximately 44 drill pads);
- Farm Dwarsrivier 372KT Remainder of Portion 6: Exploration Drilling (access roads and approximately 217 drill pads); and
- Farm Dwarsrivier 372KT Remainder of Portion 7: Exploration Drilling (access roads and approximately 38 drill pads).

The exploration activities are planned over the Dwarsrivier Mine Mining Rights, however, this will extend onto the Two Rivers Platinum Surface Rights, which includes the Two Rivers Platinum Mine Plant area, as well as Tailings Storage Facility (TSF) area. Consultation with the Two Rivers Platinum management indicated that there will be no restriction around infrastructure, but that each site will be subject to a detailed risk assessment. Where infrastructure is present, consultation with the landowner will be undertaken and drilling will only be conducted in approved areas and in line with the landowners' rules and requirements.

As the Mine is located in a mountainous area, various drainage lines are present. For this purpose and also to accommodate the drilling programme, the drill sites located within flood lines will only be accessed during the dry period. This will have a dual purpose of improved access, as well as a lesser potential impact on the water systems within such areas.

Another consideration is the presence of the Richmond Dam in the south of the mine and in close proximately to the exploration activities. A buffer will also be retained around this facility as per the recommendations of the specialists.

Project 2: The development of a number of Capital Projects

Low-Grade Product Stockpiles

The current stockpile footprints of both the low-grade and high-grade material are not sufficient to accommodate additional stockpile requirements. This specifically occurred during 2017, when sufficient capacity was not available at the ports to store product, which in turn resulted in a chain reaction, with a lack of stockpiling space on site.

Based on the above it is proposed that additional stockpiles to accommodate 55 000 tons of low-grade material at the mine be constructed. This will include three (3) new stockpiles and boom stackers and the upgrade of the existing stockpile system.

The need for an increase in the plant stockpile capacities is of critical importance to ensure flexibility in supply of chrome at the Mine. The design of the facility must allow for the storage of three (3) months' production capacity based on a total of 1.7 million tons product produced per annum.

The site will be located within the South Plant area, but will extend into an area of 1.5ha that has not previously been cleared.

North Shaft Infrastructure

The north shaft infrastructure will be an upgrade project, where the following will be undertaken:

1. Existing temporary containers and security access will be removed, and the area rehabilitated;
2. New covered parking areas will be constructed for both visitors and employees. It is the intention of Dwarsrivier Mine to pave all walking, parking and road surfaces. However, for the parking area, rock from the Discard Storage Facility will initially be used depending on the mine obtaining exemption from Regulation 5 of Government Notice 704, 1999 (GN704) from the Department of Water and Sanitation (DWS);
3. Walkways will be constructed within the North Shaft infrastructure area. These will be paved and clearly demarcated;
4. A new change house will be constructed for the underground personnel of the North Shaft. This system will tie into the existing water management system located at the South Mine, or into the planned Water Treatment Works (WTW) which will be constructed at the plant in the near future (approved as per the 2018 Environmental Authorisation);
5. New, formally constructed offices will be constructed as brick buildings;
6. A two-way access road will be constructed, which tie in with the Sekhukhune Road. This road will have a width of a maximum of 8m. The road will also include a traffic circle to manage the flow of traffic in this area. The overall length of the surface of this road will be approximately 920m. The only clearance required in this area is for the traffic circle and possibly on the kerbs of the two-way road on the eastern side. An area of about 0.7ha clearance is foreseen;
7. A new Store and associated Office area will be constructed which will serve as the receiving bay for all equipment and material stored for the North Shaft activities. A one-direction road of approximately 6m wide will be constructed to enter the area and exit the area on the other side. Access will be from the northeastern corner of the stores, in a westerly direction, with the exit located around the site on the southeastern corner, via the two-way road. The length of this road will be approximately 160m. This area will be fenced off and have strict access control;
8. The current laydown area will be formalised in dedicated areas for the North Mine activities. Bunded areas will be constructed for the storage of oils, filters, batteries, or any other material which may cause an impact on the environment. This area will be fenced off and have strict access control;
9. No additional changes will be undertaken at the North Workshop area as this area has been recently upgraded through concreting surfaces and roofing areas where chemicals are stored; and
10. Protected tree species that have been previously demarcated are present in this area. Measures will be required to relocate these species or alternatively implement the management measures which as recommended by the ecologist.

Truck Parking Area

The mine has an existing truck parking facility which is located at the entrance to the South Mine Plant. This truck parking serves all receiving and exiting trucks. The mine currently receives on average 150 arriving trucks per day. These trucks enter the truck parking, where it is weighed at empty load. The necessary signage and requirements are then assessed and corrected where necessary, whereafter the trucks enter the plant area where chrome is uploaded. The trucks then return to the parking area, where it is again weighed at its full load and the tarpaulins are secured.

Three main options have been identified for the proposed new truck parking area. With each of these options, the trucks will enter on the Two Rivers Mine Road (also known as the Richmond Road) and exit via the existing truck parking at the current mine entrance.

The Two Rivers Main Road will be designed in consultation with the relevant Roads Department (i.e. to adhere to road design parameters). Trucks will be travelling in one direction on a single-lane road and a traffic circle will be allowed for to ensure that trucks can exit this area if they do not meet safety requirements. For the road construction, discard rock from the Discard Storage Facility will be used depending on the mine obtaining exemption from Regulation 5 of Government Notice 704, 1999 (GN704) from the DWS; alternatively, the roads will be scraped and maintained. The road will be located in such a manner not to cross the non-perennial drainage channel, running in an east to west direction (between the old TSF and current Discard Storage Facility) and draining into the Groot Dwarsrivier. This channel formed part of a non-perennial drainage line, which was diverted during the time of opencast operations (lawfully in terms of the approved Water Use Licence (WUL)) in the early 2000s to allow for safe mining practices. The diversion took place at North Mine along the eastern boundary of the site (east of the now North Return Water Dam (RWD)). The channel of this drainage line is still present, and water is conveyed towards the Groot Dwarsrivier during rainfall periods. According to the hydrologist specialist studies, this channel has a flood line and is regarded as a watercourse for the purposes of the National Water Act, 1998 (NWA) (refer to Section 1.g.iv.1.g.3 on page 145).

For Option 1, the parking area is proposed to the north of the Old TSF. The non-perennial drainage channel discussed above, is present approximately 30m to the north of this location. The trucks will enter to the west of the parking, and then tie into the existing road linking the plant and the Discard Storage Facility. Trucks will be loaded at the plant whereafter the trucks will exit to the existing truck parking.

For Option 2, the facility will be located to the west of the lower RWD, just east of the Richmond Road. Trucks will enter this parking on the northern side, and will exit to the south, travelling on the existing road (Road C), linking the plant to the lower RWD. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A). An alternative to this, will be to utilise Road B, which is an existing road, traversing to the north of the Old TSF. From here the trucks will again tie up with the Road A.

For Option 3, the facility will be located to the south of the lower RWD, just northwest of the upper RWD. The trucks will enter this parking areas from the same access road as proposed for the other two options and will enter from a westerly direction and exit on the eastern perimeter of the proposed site. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A).

In all three instances, trucks will be loaded at the plant, whereafter the trucks will exit to the existing truck parking.

Based on the outcomes of the specialist studies, Option 1 is the preferred site and the option being applied for. This site is located outside of flood lines, but will require GN704 exemption due to being located within 100m of a watercourse, in addition to the utilising of discard rock as discussed hereafter.

It is expected that the truck parking area will consist of an appropriate surface such as crushed rock, a fence to demarcate the area, a security building, lighting and other associated infrastructure. The roads will be cleared and compacted with discard rock should exemption in terms of GN704 for Regulation 5 be obtained. Other activities will include:

- A turnaround area as discussed, an internal road not wider than 4m and only one way (from the turnaround area to the truck park)
- Chemical toilets or suitable alternatives for the drivers (men's and ladies') will be provided during the construction phase, whereafter septic tanks will be implemented

- Safe walkways, as well as control rooms for the electronic signboards, induction, office and store rooms.
- High mast lights and boom gates
- Automatic boom gates; and
- Weigh bridges will be located where the trucks exit the yard into the plant area.

The local road located to the west of the truck parking area, and which serves as the access to the Two Rivers Platinum Mine, will be upgraded in consultation with the relevant roads agency. This will include:

- Road widening;
- New fences; and
- A Guard House at the entrance.

South Mine Laydown Area

The Mine has a current Laydown Area on South Mine, next to the Salvage Yard. It is the intention of the mine to formalise this Laydown Area and therefore expansion of the existing laydown area footprint is required. This area will be used for the storage of various materials and equipment used in the mining operation. Specifically demarcated bunded areas will be present for the storage of material, such as oil filters and batteries, which could cause environmental pollution if not contained. The area will be fenced off with strict access control measures.

This area will also cater for the Core Shed, which will be used to store and assess all the cores collected from the exploration drilling activities.

Treated Water Reservoir

A Water Treatment Plant (WTP) is currently being constructed to treat and release excess water, or treat and reuse dirty water from Dam 26 with the aim to reduce the volumes of clean water abstraction from alluvial boreholes in the future – this requirement arose from the water balance and water management study and does not form part of this application, but rather as a commitment that the mine must investigate the required design for the intended purpose of treating dirty water to be reused in the mining process. The WTP is a condition of the 2008 WUL. The treated water will be discharged through the outlet to the proposed Treated (Clean) Water Reservoir, located just north of Dam 26, to the northeastern corner of the WTP. The overall facility is located in an old contractor's yard, and therefore no vegetation clearance is required.

Security Office Upgrades

The existing entrance at the main offices currently comprises of a security access point and visitors parking. It is the intention of the mine to formalise this area into a formal security access area (brick building) and a more logistical layout for the parking to accommodate additional parking spaces. No additional clearance will be required for this purpose. An additional roadway will also be required. This road will allow for a traffic circle to regulate traffic and will be about 8m in width with a maximum length of 250m, including the traffic circle. No clearance will be required for this activity as it will be located in the existing area.

Topsoil Stockpile Expansion

The clearance activities on site will allow for the maximum removal of topsoil from the proposed sites but will also necessitate additional areas for the stockpiling of such topsoil for rehabilitation purposes. For this reason, it is recommended that Topsoil Stockpile #3 [naming in terms of the Topsoil Management Plan (GCS, 2016)] be expanded.

<u>Project 3: Diesel Storage</u>

North Mine Fuel and Diesel Supply

Similar to the Bulk Fuel Storage Area at South Mine, the North Mine requires a dedicated area to supply fuel and oils to the underground workshop. This area will comprise of two (2) 23m^3 tanks, one for hydraulic oils and one for diesel. The area anticipated is located to the southwest of the North RWD.

The tanks will be serviced and operated by Total (the planned new fuel supplier of the mine).

The two tanks will be placed on concrete bunded systems, with a sump to capture any potential spills which may occur. Around the bunded area will be a smaller bunded area, in which the fuel filling pipes are located. Small diameter steel pipes will supply fuels to the underground workshops, though a cemented tunnel.

Fuel and Oil Storage and Tank Decommissioning

Dwarsrivier Mine is planning on appointing a new fuel supplier, Total. Due to transfer in service providers, the new supplier will be conducting studies on the current status of the existing tanks and in this process will remove the existing facilities and replace these with Total-type facilities. The removal (therefore decommissioning) of the existing facilities will specifically take place at the current South Mine TMM (Trackless Mobile Machinery) Workshop, as well as at the South Mine Bulk Fuel Supply System (the latter supplies fuel to the underground workings). In addition to this, the Mine will be erecting two new facilities, one at the North Mine, within an existing cemented and bunded area, and one at the future Workshop Area at the plant. It is currently planned that the mine will store a total volume of 340m^3 of fuel/ oils on site (excluding the underground fuel supply of North Mine - with this included the total storage capacity will be 386m^3). It is planned that fuel and oil storage will take place at 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; and
- Farm Dwarsrivier 372KT Portion 1: Plant Workshop.

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 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.

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

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*
Resource and Reserve Drilling			
Construction of roads to access the drill sites. (Roads will be of a temporary nature for access to drill sites at a width of approximately 6m wide. Various drainage channels are present in this area, which will have to be crossed to access the required sites. It is unlikely that large scale excavation will be required for the construction of the roads.) It is unlikely that large scale excavation will be required for the construction of the temporary roads. The project will ensure that road development will be scheduled to occur, as far as practically possible, during the dry	25ha (Roads and drill pads with a combined area of about 40ha), roads will be more than 35km in combined length.	x	**Listing 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 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. (32m from watercourse).*

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*
seasons. Where possible existing roads will be utilized. No additional road crossings will be constructed over the main river systems (Groot or Klein Dwarsrivier or the Springkaanspruit). Where roads are required over non-perennial drainage lines, these will be applied for with the DWS.			**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 3, Activity 14**: The development of (xii) infrastructure 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 drill pads (at about 323 sites). Drill pads will be 20m x 20m each in extent and will comprise of the drill site and a portable sump/ container for the storage of dirty water originating from the drilling activities. Temporary offices may also be erected if and when required. Small scale diesel/ lubrication/ oil storage may be required for the drill rigs, although the specific volumes cannot be determined at this time. Therefore provision has been made for the minimum listing notice trigger. The drill sites will be located outside of the 1:100 year flood lines.	13ha (roads and drill pads combined at about 40ha)	x	**Listing 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 1, Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. **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. **Listing 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 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.
Capital Projects			
Low-Grade Stockpile (no additional roads will be required, as the entire area will be located within the plant area on a concreted surface). This facility may be located within the 100m buffer of the diverted non-perennial drainage line.	2ha of which 1.5ha clearance is required.	x	***Listing 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. (32m from watercourse).* **Listing 1, Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 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.

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*
			Listing 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 3, Activity 14**: The development of (xii) infrastructure 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.
North Mine Infrastructure (the project will include the construction of roads, traffic circles around the infrastructure areas, buildings such as a change house and fences). Note that the buildings are the formalisation of existing areas and no additional clearance is required. Clearance will only take place around specific areas surrounding the road construction. Roads will be between 6m and 8m in width depending on whether these are single lanes or double lanes.	2.8ha of which only 0.7ha clearance will be required.	x	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.
South Mine Truck Parking This activity will require the relocation of Topsoil Stockpile #4. This material will either be relocated to Topsoil Stockpile #3 or be used in ongoing rehabilitation activities around South Mine. No river crossing is required. The facility will however be located within the 100m buffer of the drainage channel as defined in the flood line study. A turnaround area (traffic circle) inside the mine property will be required to allow for trucks to be withheld if not compliant with safety and environmental standards, the internal road will not be wider than 4m, and only one way up until the Truck Parking. A two way road at 3.5m each (7m in total) will extend from the Truck Parking to the final exit.	3ha	x	**Listing 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 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 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 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.
South Mine Laydown Area, including the core yard, which will include an access road.	2.8ha	x	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity.

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*
			Listing 3, Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.
Treated Water Reservoir (900m³). This facility will be located within existing disturbed areas.	0.5ha (no clearance required)	x	**Listing 3, Activity 2**: The development of reservoirs excluding dams, with a capacity of more than 250 cubic metres.
Security Office Upgrades. New security office (brick building with steel roof). Road of 250m in length with a maximum width of 8m.	No clearance required.	x	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres.
Fuel and Oil Storage and Supply to North Underground Mine. Two 23m³ storage tanks with associated pipes are required. Pipelines will be required to supply fuel to underground operations. These will be small diameter pipelines with flow meters attached. Note, that the exact design and layout of this area has not been finalised and therefore the clearance of the area is still considered a listed activity.	Supply area: 9.8ha (a maximum area of 0.05ha clearance will be required – 500m²). 2 x 23m³ tanks in diesel bunded area, with steel pipes supplying underground workshops through a cemented tunnel.	x	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except 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. **Listing 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.
Expansion of the existing Topsoil Stockpile at South Mine.	0.6ha	x	**Listing 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.
Fuel and Oil Storage and Supply			
The existing diesel storage areas will be decommissioned and replaced by new facilities. This storage of fuels and oils will be located within existing disturbed areas. a. Decommissioning of exiting tanks at South Mine (TMM Workshop and Bulk supply). b. Establishment of new facilities (total capacity of 295m³). No additional clearance activities are required.	No additional clearance – replacement of existing sites	x	**Listing 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. **Listing 1, Activity 31**: The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice. **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

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*
			storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.
General			
Overall Clearance	65ha	x	**Listing 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.

Aim and Motivation of the Project

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.

With specific reference to 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."

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.

Alternatives Considered

Resource and Reserve Drilling - location

The location of the resource and reserve drilling programme is directly linked to the Mining Right Area. The demarcation of the drilling sites is as per a specific drilling plan with an exploration site located every 150m.

Various considerations were taken into account in determining the final location of the exploration drilling sites:

- Sites are subject to the rules and requirements of surface right owners, which in this case will include Two Rivers Platinum Mine. The area where Dwarsrivier Mine will deviate from the drilling layout previously considered during the Scoping Phase, will be around infrastructure such as the Two Rivers TSF and Two Rivers Plant areas. Drilling will however still be located within the same property and approximate location.
- 1:100 year flood lines (see Section 1.g.iv.1.g.4);
- Location of heritage buffers;
- 100m buffer around the Richmond Dam; and

- 32m buffer around riparian zones.

Based on the above, the initial drill plan indicated 369 exploration holes, with the consideration of the specialist studies the drill plan has been amended to 323 exploration holes (located outside of the 1:100 year floodline and 32m buffer around the riparian zones and heritage exclusions as requested by the specialists).

Truck Parking – location

For Option 1, the truck parking area is proposed to the north of the Old TSF. The non-perennial drainage channel discussed earlier, is present approximately 30m to the north of this location. The trucks will enter to the west of the parking, and then tie into the existing road linking the plant and the Discard Storage Facility. Trucks will be loaded at the plant whereafter the trucks will exit to the existing truck parking.

For Option 2, the facility will be located to the west of the lower RWD, just east of the Two Rivers Mine Road. Trucks will enter this parking on the northern side, and will exit to the south, travelling on the existing road (Road C), linking the plant to the lower RWD. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A). An alternative to this, will be to utilise Road B, which is an existing road, traversing to the north of the Old TSF. From here the trucks will again tie up with the Road A.

For Option 3, the facility will be located to the south of the lower RWD, just northwest of the upper RWD. This area is the most disturbed area of the three options. The trucks will enter this parking area from the same access road as proposed for the other two options, and will enter from a westerly direction and exit on the eastern perimeter of the proposed site. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A).

Option 1 has been identified as the preferred option.

Option 1- Preferred (preferred option)

This option is located between two existing mining activities, provides no faunal habitat linkage and is not likely to be important for faunal species movement. The shallow soils and rocky nature as well as the close proximity to the ongoing mining and related activities, disqualifies this option for cultivation, grazing and wildlife activities. A number of *Lydenburgia cassinoides* (Sekhukhune Bushman's-tea) are located to the east of the parking area, predominantly along the diverted drainage line. These will need permit applications should removal/ destruction be necessary. A small number of *Vitex obovata* trees were observed within the eastern extent of the parking area and towards the stockpile, which are considered important food resources for the Cicada species *Pycna silva*, however there is a low probability that this area will be used by this species. According to the ecological specialists (SAS) (see Annexure 6), the diverted drainage line traversing this area is no longer considered a naturally functioning watercourse from an ecological perspective. This truck parking option falls outside of the flood lines, but within the 100m buffer of the drainage line. It is therefore unlikely that the proposed truck parking will disturb the drainage line or be at risk of flooding. The elevated area (approximately 1.5m to 3m elevation difference) on which the truck parking is proposed, should be kept in place, as it provides important elevation for the left bank of the drainage line. Due to the truck parking facility being located within the 100m buffer of the drainage line, it is likely that a GN704 exemption from Regulation 4(a) and (b) will be required.

Option 2 – Less Preferred

The faunal and floral habitat with this area has been degraded by the surrounding mining activities, however not severely. No floral or faunal Species of Conservation Concern (SCC) were observed or are expected to occur within this area. The parking area is not located within any flood lines or freshwater systems boundaries, however it is located closer to the 100 year flood line than that of Option 3. Although truck parking Option 2 falls outside of the flood lines, it is located within the 100m buffer of the Dwarsrivier. It is therefore likely that the proposed truck parking will disturb the drainage line or be at risk of flooding. It is also located upgradient of the Groot Dwarsrivier, thus increasing the risk of transport of hydrocarbons and sediment by storm water into the river.

As such, although the habitat within Option 2 is not considered important from a floral or faunal perspective.

Option 3 – Least Preferred

From a soils and land capability perspective this option is not considered important for commercial cultivation, however it presents increased grazing opportunities due to the close proximity to the Klein Dwars and Groot Dwarsrivier and provides suitable and high quality grazing and browsing material for herbivorous species in the area.

In addition, the small patches of moderately deep soils to the west of this option further qualifies this area for grazing and wildlife, even though a large portion has previously been subject to disturbances. In terms of faunal species, Option 3 extends towards the Groot and Klein Dwarsrivier systems which provide habitat linkages and movement corridors and Option 3 being located between the fenced area of the mine and these river systems, the habitat is fairly isolated from outside anthropogenic activities, notably that of hunting and snaring. As such, this area is considered important in terms of faunal species breeding, acting as an area of refuge. No floral SCC were observed, however the vegetation component is still largely intact, providing habitat to a number of indigenous terrestrial species.

In addition to potential impacts on faunal and floral habitat in the area, development of the truck parking in this area will also result in an increases area of hard surfaces as well as further vegetation clearing for connecting roads. This will result in increased water runoff into the Klein and Groot Dwarsrivier, carrying pollutants, leaked fluids from trucks and increased silt loads into the river systems located downgradient of Option 3. Although truck parking Option 3 falls outside of the flood lines, it is located within the 100m buffer of the both the Dwarsrivier and Springkaanspruit.

Based on the outcomes of the specialist studies, **Option 1 is the recommended option** for the Truck Parking.

Discharge of fissure water

Given the draft outcomes of the aquatic specialist investigation, the risk assessment undertaken indicates that the risk posed by the discharge is high and thus if inappropriately managed the impact on the Groot Dwarsrivier is likely to be very significant. If the dewatering program is well managed and the discharge rates constantly adjusted to ensure the required dilution ratios, the risk can however be reduced to a moderate risk.

It was the view of the specialist that further testing in terms of toxicity tests and discharge monitoring on the Groot Dwarsrivier be undertaken during the coming Winter, as this will allow for low flow parameters to be assessed. Due to the fact that further studies are required, consultation in this regard will first be undertaken with the DWS prior to initiation of future applications.

This project was therefore withdrawn from the EIA Application at this time.

Technological considerations

The use of mobile sumps or constructed sumps as part of the drilling activities will be considered as part of the project development. However, at the present time it is foreseen that mobile sumps will be utilised as these will then be removed by licensed companies, without adding to the waste disposal system on site.

Application and Consultation Process

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources (DMR) on 11 April 2018. A letter of acknowledgement from the DMR was received on 24 April 2018. 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 visible locations close to the site, on 17 April 2018, in order to inform surrounding communities and adjacent landowners of the proposed project.
- The following key stakeholders 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.
- In accordance with Chapter 6 of GNR 982 41(2)(c) an advert was placed in the Steelburger Newspaper on 20 April 2018.

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

The Draft Scoping Report was placed on public review for a period of 30 days from **15 May to 13 June 2018**. Printed copies were available at the Dwarsrivier Mine offices. Printed copies were also provided to Two Rivers Platinum on request and to all commenting authorities.

In addition to the minimum requirements outlined in GNR 982, the Environmental Assessment Practitioner (EAP) has also undertaken the following:

- Distribution of notification letters to Dwarsrivier Mine stakeholders via email and fax (where contact data is available);
- A focus meeting was held with the Department of Agriculture Forestry and Fisheries (DAFF) on 23 May 2018 after which time a site visit was undertaken;
- A focus group meeting was also held on 23 May 2018 with representatives of Two Rivers Platinum Mine, during the Draft Scoping Report review period;
- A Project Meeting was held with the DMR on 11 June 2018 in Polokwane;
- A Focus Group Meeting was held with Two Rivers Platinum Mine on 12 June 2018; and
- A meeting was held with the DWS in Lydenburg on 19 July 2018.

The Final Scoping Report was acknowledged by the DMR on 26 June 2018.

The comments received from stakeholders are presented below:

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	General Comments			
1	Please register the following people from Glencore Eastern Chrome mines: Lee-Ann Ryan-Beeming Craig Maule Japie van der Berg	20 April 2018 via e-mail and formal registration sheets completed.	Ms Lee-Ann Ryan-Beeming	Comment Noted, all three individuals were registered on the Dwarsrivier Mine EIA project Database.
2	Acknowledge the notification sent. The Department [Limpopo - Department of Economic Development, Environment and Tourism (LDEDET)] will await hard copies of Scoping Reports for commenting	20 April 2018 via e-mail.	Ms Mokgadi Mogashoa: LDEDET	Comment Noted, a hard copy of the draft scoping report was delivered to Ms Mogashoa.
3	My name is Aniah Makgoo and I wish to register as an Interested and Affected Party [I&AP]. I work for a wastewater treatment company and would like to participate by giving comments. Please send me more information about the project and information about how to register as an I&AP.	20 April 2018 via e-mail.	Ms Anjah Makgoo: General Public	Comment Noted. The Background Information Document with registration sheet was e-mailed to Ms Makgoo. She was also registered on the EIA project database.
4	Acknowledge the notification sent.	22 April 2018 via email.	Mr Henk Moen: Boulder Group of Companies: Adjacent property owner of Farm De Grooteboom 373KT (Portions 8 & 10)	Comment Noted, Mr Moen was registered on the Dwarsrivier Mine EIA project Database.
5	The office of the [Regional Land Claims Commissioner] RLCC: Limpopo hereby acknowledges receipt of your communication dated 26 April 2018. Kindly be informed that the office confirms the receipt of several individuals and community claims which were lodged in respect of the farm Dwarsrivier 372KT.	30 April 2018 via formal letter sent.	Mmakolobe Mononyane: Limpopo Commission on Restitution of Land Rights	Comment Noted, all the claimants and representatives were added to the project database and informed of the said EIA application at the Dwarsrivier Mine. Additional investigations will take place in order to determine the portions associated with the land claim.
6	Would like to register on the project database.	25 April 2018 via sms.	Mr Vincent Masie Mokebisa: General Public	Noted, Mr Mokebisa was registered on the project database.
7	She will review the Draft Scoping Report, discuss possible issues with the relevant representatives of Two Rivers Platinum and then provide feedback in this regard. She would also involve Mr. Francois Vermeulen, as Plant Manager of Two Rivers Platinum in the process.	23 May 2018 Focus Group Meeting.	Ms. Poseletso Sebako: Two Rivers Platinum	It was indicated that the consultants would have a follow-up meeting with Two Rivers Platinum during the EIA Phase of the project if required. Comments on the Draft Scoping Report were to reach the consultants by 13 June 2018. Dwarsrivier Mine has had meetings with the Two Rivers Platinum to discuss the location of the drilling pads and will be in continuous consultation

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				regarding the logistics around the Truck Parking development and access roads.
8	Are there any challenges foreseen for Two Rivers Platinum not supporting this project? The Draft Scoping Report would be studied and integrated comments would be submitted.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum and Ms. Poseletso Sebako: Two Rivers Platinum	The Draft Scoping Report includes scoping specialist studies only. The detailed specialist studies would be done during the EIA. It is still important for Two Rivers Platinum to review the Scoping Report and Scoping specialists' studies as it would be ideal to include Two Rivers Platinum's requirements for specialist studies in the Plan of Study for the EIA. The list of specialist studies to be undertaken was provided. Biomonitoring and work as part of the specialist studies undertaken by Scientific Aquatic Services (SAS) have started. These specialist teams would be in the area on 23 and 24 May 2018. A hard copy of the Draft Scoping Report was given to Two Rivers Platinum.
9	The Department of Agriculture, Forestry and Fisheries [DAFF] acknowledges the receipt of the aforementioned report. The Department is the custodian of the National Forests Act (Act No 84 of 1998) as amended, which among others provide special measures for the protection of forests and trees. The list of trees is gazetted annually.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted.
10	Two Rivers Platinum intends to submit comments on the Scoping Report, in addition to these meeting minutes	12 June 2018 Focus Group Meeting,	P. Sebake: Two Rivers Platinum	Comment Noted.
	Mining and Property Related Comments			
1	It was indicated that the proposed truck parking area could impact on the entrance road of Two Rivers Platinum. These trucks would increase the volumes on the local access road which could result in delays of their buses transporting personnel to the mine. This could then again impact on their production capacity. Two Rivers Platinum thus cannot afford delays in terms of access to the mine. Other concerns relate to possible road surface damage.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	Comment Noted. It was explained that the trucks would use one lane where they enter the truck parking area (empty trucks) and exit (loaded trucks) elsewhere. Two Rivers Platinum must submit their concerns and shift challenges in this regard so that these issues can be listed, assessed and addressed. The aim of the introductory meeting was to initiate the engagement with Two Rivers Platinum. It is thus requested that Two Rivers Platinum comment on the Draft Scoping Report to ensure that there are no risks and liabilities for Two Rivers Platinum. Further information such as the following is also required in terms of Two Rivers Platinum's • requirements for access control; • requirements for rehabilitation; • restrictions along the TSFs, • buffer zones in terms of the TSFs; and • other issues and concerns These types of requirements can then be noted as conditions in the Dwarsrivier Environmental Management Programme (EMPr). Such conditions would have to protect both companies. Comment on any activities from Two Rivers Platinum would be welcomed, even with regards to activities to be undertaken on Dwarsrivier Mine' s property. Ms. Bekker suggested that Two Rivers Platinum send her the shape files of their surface rights area and EMPr. She will then overlay the Dwarsrivier Mine activities on those shape files and return the documents to Two Rivers Platinum in order to assist with the decision making regarding the drilling project. Please refer to Figure 6 of this report for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development.
2	Two Rivers Platinum requires more information on the proposed design of the truck parking area, shift patterns, schedules of use and volume increases.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	The issues would be covered under the Dwarsrivier Mine EMPr. EnviroGistics requests a copy of the Two Rivers Platinum EMPr to determine the possible

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				requirements as included in the development of the EMPr, as the Two Rivers Platinum rehabilitation commitments on its surface rights area will have to be considered as part of the drilling activities. This was noted and provided to EnviroGistics.
3	At this stage he would like to note the following: How will Two Rivers Platinum be legally accountable when Dwarsrivier Mine continues with their activities within the Two Rivers Platinum licensed area? How should reporting be undertaken when outside workers/ contractors are on their property? Who would remain responsible for the safety of those workers/ contractors and so forth?	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	Environmental Authorisation is required before Dwarsrivier Mine can continue with the proposed activities, but various contracts with regards to e.g. safety, rules regulations around the plant, monitoring and so forth also need to be formalised between Dwarsrivier Mine and Two Rivers Platinum. Dwarsrivier Mine would have to have close contact with Two Rivers Platinum as the affected area would be on their surface rights area. Workers would possibly be managed in the same way that contractors are managed. Mr. Pieter Schoeman (Environmental Superintendent, Dwarsrivier Mine): Once Dwarsrivier Mine obtains an approval, discussions between Dwarsrivier Mine and Two Rivers Platinum should be undertaken and the necessary contracts have to be drawn up. These would relate to e.g. safety and health aspects and so forth. Please refer to Figure 6 for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development.
4	In which direction does the mine plan to develop?	23 May 2018 Site Visit.	Mr. Mabilu: DAFF	The proposed future plans of the mine were discussed by means of a map.
5	How deep was the open cast area?	23 May 2018 Site Visit.	Mr. Mabilu: DAFF	The open cast area was approximately 30-40 m in depth.
6	What type of wild animals are found within the mining areas?	23 May 2018 Site Visit	Mr. Mabilu: DAFF	Various types of antelope e.g. kudu are typically found, small carnivores and reptiles (refer to Annexure 6 for the ecological study).
7	The main objectives of the meeting is to discuss the positioning of exploration boreholes that fall within close proximity to Two Rivers Platinum infrastructure, notably the Plant and the TSF. The main message from Two Rivers Platinum is that there is no objection to the proposed drilling, but specific boreholes will have to moved, specifically those planned inside, or in close vicinity of the infrastructure mentioned above.	12 June 2018 Focus Group Meeting,	P Sebake: Two Rivers Platinum	Comments on the placement of boreholes planned for Year 1: Dwarsrivier Mine will not be able to drill within plant boundaries, and alternative positions will have to be pegged, preferably outside the boundary fence of the plant. The boreholes planned for Year 1 at the Two Rivers Platinum TSF can perhaps be relocated to the old Richmond Road, where it will not obstruct Two Rivers Platinum operations. A walkthrough of the proposed borehole locations must be conducted by Dwarsrivier Mine and Two Rivers Platinum to confirm the placement of boreholes and the practicality of drilling in some areas. Main operational areas and office areas are to be considered no-go areas for drilling. The main reason for this is that access to these areas will be a logistical challenge. Dwarsrivier confirmed that a WUL will be obtained if required by the DWS for the drilling inside the flood lines. Please refer to Figure 6 for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development. Note that the drilling in flood lines have been excluded from the project layout.
8	Two Rivers Platinum requested that Dwarsrivier Mine send dwg Files to Two Rivers Platinum so that the placement of the boreholes can be overlain on	12 June 2018 Focus Group Meeting.	P Sebake: Two Rivers Platinum	Dwarsrivier Mine will send this to Two Rivers Platinum.

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	the Two Rivers Platinum infrastructure more accurately. There are no specific Two Rivers Platinum buffer areas around the TSF, but Dwarsrivier Mine should take note of the 400kv Eskom line servitude.			Comment Noted regarding Eskom powerline. Eskom was also informed of the said EIA application.
9	Two Rivers Platinum reiterated the challenge currently experienced because of the trucks parking on the main road outside the Dwarsrivier Mine plant entrance, and indicated that they (Two Rivers Platinum) also support the development of a new truck parking area at Dwarsrivier Mine.	12 June 2018 Focus Group Meeting.	P Sebake: Two Rivers Platinum	Comment Noted.
	Ecology Related Comments			
1	Tree species existing within the area include *Boscia albitrunca*, *Elaeodendron transvaalensis*, *Sclerocarya birrea* subsp. *caffra*, *Balanites maughamii* and *Lydenburgia cassinoides*. Tree species mentioned above are protected in terms of the National Forests Act, 84 of 1998. All activities should be done in compliance with Section 7(1) and Section 15(1) of the National Forest Act. In terms of Section 7(1) of this Act no person may cut, disturb, damage or destroy any indigenous living tree in a natural forest or possess, collect, remove, transport, export, purchase, sell and donate except in terms of a licence issued by the minister. In terms of Section 15(1) no person may cut, disturb, damage, destroy or remove any protected tree, or collect transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under licence granted by the minister.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted. The applicant will ensure that the proposed developments adhere to Sections 7(1) and 15(1) of the National Forests Act. If a licence is needed to undertake any of the said activities, an application will be lodged with the Department. An ecological assessment for the developments is currently taking place. The detailed list of tree species within the study area will be provided as part of the draft EIA. Please refer to Annexure 6 for the ecological report.
2	*Lydenburgia cassinoides* (Sekhukhune bushman's tea) is confined to Sekhukhune District Municipality only. Any activities which lead to the impact to this floral species should be avoided at all cost. If any manner avoidance cannot be adhered to, reasonable steps should be taken to ensure its existence. It is also on brink of extinction due to over-utilisation from the surrounding communities. The Department requires a plan that will ensure its continuous existence within the area.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted. The mine will ensure that no *Lydenburgia cassinoides* (Sekhukhune bushman's tea) is damaged in any way during the proposed new developments. The impact on these trees will be avoided at all cost. Three options were considered for the Truck Parking, with the chosen option, Option 1, the most suitable according to the ecological study. Please refer to Annexure 6 for the ecological report. Please refer to Part B of this report, which details the management measure proposed by the Ecologist and EAP.
	Heritage Comments			
1	South African Heritage Resources Agency (SAHRA) Archaeology, Palaeontology and Meteorites (APM) Unit accepts the Heritage Scoping Report and its recommendations and awaits the submission of the Heritage Impact Assessment (HIA) report. The development is not mapped on the SAHRIS palaeomap, which prevents SAHRA from assessing the palaeontological sensitivity of the mine right area. SAHRA is unable to determine the impacts to any fossiliferous rocks or sediments within the development footprint. Therefore, SAHRA requires an assessment of palaeontological resources conducted by a suitably qualified palaeontologist.	Letter Dated 20 July 2018.	Nokukhanya Khumalo	Please refer to Annexure 6 and Section 1.g.iv.1.l, which includes the findings of the Heritage and Paleaontological Study.
	Water Related Comments			
1	My interest is solely on the discharge of fissure water into Dwarsrivier and improvement of water quality on the river. My concern is the possibility of contaminating the river system with chromium. Chromium is a heavy metal which tends to undergo chemical speciation and its main stable oxidation state is hexavalent and trivalent chromium. Although trivalent Chromium is as essential human nutrient at lower concentrations, hexavalent chromium is carcinogenic and mutagenic even at lower concentrations. This can affect aquatic life in	30 April 2018 via e-mail.	Ms Anjah Makgoo: General Public	This project has been excluded from the current Environmental Authorisation Process. Further hydrological and aquatic studies are required to determine the impact of the discharge onto the Dwarsrivier system.

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	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	the river and can impact the community negatively as domestic animals drink from the river and can in turn have an impact on the health of the community as a whole. I would like to know the mitigation plan of the mine on this issue. A number of heavy metals can have an impact on the water. The water can however be tested at an accredited laboratory for evident heavy metals and later be treated to reduce the concentrations of heavy metals to acceptable limits, prior to discharge into the river. The mine can have a small plat whereby it will treat its own water prior to discharge. There are other determinants that the water can be tested for such as total suspended solids, total suspended solids, dissolved metals etc. The water must be sampled from upstream of the river and downstream of the river to check if the water from the mine is improving the quality of water of deteriorating the river system. However I would like to have more information on how the mine is planning to check the quality of the water in the river.			
2	A meeting was held with the DWS to discuss the flowing: Should the product stockpile be applied for as a Section 21g water use? Should the mine apply for Section 21c&i regarding the temporary crossings of the drainage lines for the exploration roads? Should the mine apply for GN704 exemption for the Truck Parking located outside of the flood line, but inside of the 100m buffer of a watercourse? May the mine utilise discard rock for the use of road construction?	19 July 2018, meeting with DWS.	Ms. Portia Munyai, Mr. Adam Ramakgadi and Ms. Mathabo Kgosana: DWS	Should the product stockpile be applied for as a Section 21g water use? Yes, a Section 21g water use must be applied for. Should the mine apply for Section 21c&i regarding the temporary crossings of the drainage lines for the exploration roads? The DWS will consult with the specialist department and advise the mine accordingly. Should the mine apply for GN704 exemption for the Truck parking located outside of the flood line, but inside of the 100m buffer of a watercourse? The DWS will consult with the specialist department and advise the mine accordingly. May the mine utilise discard rock for the use of road construction? The mine will have to apply for GN704 exemption for the use of discard rock.

Key Findings from the EIA and EMPr

Below, please find a summary of the key findings pertaining to the environmental authorisation application based on the outcomes of the specialist investigations:

Other Licence Requirements

A Water Use Licence Application (WULA) has not yet been submitted. A WULA will be submitted prior to the commencement of the proposed project. No activities will be undertaken without the necessary approvals.

The WUL will not only cater for this project, but will be an update of the overall mine WUL to correct all changes and administrative errors. For this project, the following activities may trigger water uses as indicated:

- Section 21c&i applications for exploration roads, where these may cross non-perennial drainage channels;
- Section 21b for the storage of water;
- GN704 exemption for the location of infrastructure within the 100m buffer from watercourses, this may be for the Truck Parking, Product Stockpile and Exploration Activities;
- GN704 exemption for the use of discard rock in the construction of berms, roads and parking areas; and
- Section 21g for the construction of the Product Stockpile.

Capital Projects including Diesel Storage and Supply

Alternatives:

In terms of alternatives, the Truck Parking raised the key assessment in terms of location with the provision of three (3) options. Based on the various specialist studies undertaken, none of the options presented a fatal flaw. However,

Option 1 was identified as the most preferred site in terms of the hydrological, soils, ecological and freshwater ecosystem considerations. This facility will be located outside of the 1:100 year flood line, but will still require exemption from GN704 from the DWS due to its location within 100m of a watercourse.

Due to further investigations required, the discharge of fissure water into the Dwarsrivier has been excluded from this Environmental Authorisation Application Process.

Logistics:

During the planning phase of the various proposed Capital Projects, no specific impacts will take place directly, however, poor planning during this phase could result in significant project delays. This will be due to WULA, Environmental and Road Upgrade Authorisations not being in place and/ or agreements not being in place between all surface landowners where applicable to enable access.

During the construction phases of the activities, there is the possibility of impacting on the logistical arrangements of adjacent mines, such as Two Rivers Platinum. This is due to the upgrades which will be required on the regional access road, which is also utilised by Two Rivers Platinum for personnel and product transportation. The establishment of infrastructure for the exploration activities may also impact Two Rivers Platinum, as several of the drilling sites are located in close proximity to areas where operational activities of the said mine is being undertaken, notably the Plant and the TSF.

Soils and Land Capability:

From a soil and land capability point of view, this proposed Capital Projects are not regarded as being fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be considered and implemented accordingly in efforts to conserve soil resources.

Ecology (fauna and flora):

The proposed capital projects are all located within the existing active mining area, and as such, the impacts associated with the various projects are expected to be of low to medium-low significance prior to the implementation of mitigation measures. With the cognisant implementation of mitigation measures, these impacts can be minimised to low and very-low significance.

Aquatics and Freshwater:

Based on the findings of the aquatic and freshwater assessment, the proposed development of capital infrastructure generally poses a low risk to the freshwater resources due to the distance of the planned infrastructure from freshwater resources. Nevertheless, the adherence to cogent, well-conceived mitigation measures as well as general good construction practice will aid in reducing the impact significance to acceptable levels.

Hydrology:

During the site visit, a remnant drainage line/ ditch was noted between the old TSF and Discard Storage Facility in the vicinity of Truck Parking Option 1. This drainage line was previously diverted to prevent flooding of open pit operations, which have since been rehabilitated. The diversion is still currently in place, and diverts runoff away from the North RWD, and into the Springkaanspruit. Truck Parking Option 1 falls outside of the flood lines, but within the 100m buffer of the drainage line. It is therefore unlikely that the proposed truck parking will disturb the drainage line or be at risk of flooding. However, the elevated area (approximately 1.5m to 3m elevation difference) on which the truck parking is proposed, should be kept in place, as it provides important elevation for the left bank of the drainage line. Due to the truck parking facility being located within the 100m buffer of the drainage line, it is likely that a GN704 exemption from Regulation 4(a) and (b) will be required.

Hydrogeology:

The mine proposes to use discard from the Discard Storage Facility for road and truck stop construction. Recent leach tests on this material indicate that the majority of leachable elements were below the laboratory detection limits. As such, the use of the rock as fill material is not expected to impact significantly on groundwater quality during the operational phase of mining and post-closure.

Heritage:

From a heritage perspective, no areas of concern were identified where the Capital Projects are planned. The impact of the proposed project on heritage resources can be mitigated and it is recommended that the proposed project

can commence on the condition that the recommendations made in this report are implemented as part of the EMPr and based on approval from SAHRA.

Exploration Activities

Alternatives:

The location of the resource and reserve drilling programme is directly linked to the approved Mining Right Area. The demarcation of the drilling sites is as per a specific drilling plan with an exploration site located every 150m. Various considerations were taken in the decision of the final location of the exploration drilling site placement:

- Sites are subject to the rules and requirements of surface right owners. Although the exploration activities are planned over the Dwarsrivier Mine Mining Rights, this will extend onto the Two Rivers Platinum Surface Rights area. The area where Dwarsrivier Mine will deviate from the drilling layout previously considered during the Scoping Phase, will be around infrastructure such as the Two Rivers Platinum TSF and Two Rivers Platinum Plant. Drilling will however still be located within the same property and approximate location.
- The freshwater/ wetland study indicated a 32m buffer around riparian areas.
- The required buffers as identified by the heritage study will be adhered to.
- In terms of the flood line assessment, various ephemeral (only flowing in response to high rainfall) drainage lines are present on site. Dwarsrivier Mine has committed to exclude all areas within the 1:100 year flood lines from the drilling activities.

The final draft exploration drilling map is indicated in Figure 6.

Based on the above, approximately 5% of the drill sites previously considered have been excluded from the final project plan

It is key to note that the outcomes of the location recommendation of the exploration activities and drill sites in terms of this EIA are based on the specialist investigations and have not considered the required safety considerations required in comprehensive exploration drilling. It is therefore important that the applicant ensures that the exploration drilling is undertaken in such a manner as to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

Soils and Land Capability:

Potential arable soils (Bonheim) will be slightly impacted by the proposed drilling and exploration activities to the north of the Mining Rights Area since the current drilling layout intrudes on these soils; this will however be further mitigated by excluding the 1:100 year flood line from the drilling activities. From a soil and land capability point of view, this project is not regarded as fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be strongly considered and implemented accordingly in efforts to conserve soil resources.

Ecology (flora and fauna):

The impact significance associated with the construction of drill pads and access roads is notably higher than that of the Capital Projects, as the associated footprints are predominantly located in areas of increased sensitivity and are likely to impact upon several floral and faunal SCC and preferred/ niche habitats. Prior to the implementation of mitigation measures, the perceived impacts are of medium-low to medium-high significance for the areas of increased sensitivity, and low to very low in the less sensitive areas e.g. Transformed and Old Agricultural Lands Habitat Units and disturbed habitats. With the implementation of mitigation measures as stipulated in this report, the impacts associated with the sensitive habitats e.g. Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units can be decreased to low and medium low significance, whilst the impacts associated with the less sensitive habitats e.g. Transformed and Old Agricultural Lands Habitat Units can be decreased to a very low significance.

Aquatics and Freshwater:

Based on the findings of the aquatics and freshwater assessments and the results of the impact assessment, it is the opinion of the ecologist that some aspects of the proposed exploration expansion project, specifically the planned exploratory drilling within watercourses, carries the potential to pose a significant and unacceptably high cumulative risk to several important and sensitive drainage systems in the area most notably the Groot Dwarsrivier, Klein Dwarsrivier and Dwarsrivier, which may in turn have an indirect impact on the functioning of downstream systems,

including the Steelpoort River. It is recommended that the proposed drill plan be revised to exclude the active channels, delineated floodplains and delineated riparian zones of all watercourses (32m) within the Mining Right Area. Drilling within the 1:100 year flood line carries the potential to have a significant impact on the receiving environment, however the impact significance may be reduced by strict adherence at all times to well-developed mitigation measures. For this reason the applicant has committed to exclude all drilling activities from the 1:100 year flood lines. Access roads will be restricted as far as practically possible to existing roads and where crossings are required, such will be undertaken in terms of the specialist recommendations.

Hydrology:

A number of drilling targets and access roads were initially located within the flood lines and 100m buffer. The project plan has been amended to exclude all drilling pads from the 1:100 year flood lines.

Hydrogeology:

- Intersection of groundwater during exploration drilling

The groundwater table will be intersected during exploration drilling. The existing dataset confirms that the average depth to groundwater is 7,5m. Due to the fact that biodegradable drilling fluids will be used, groundwater contamination associated with exploration drilling is not expected to be significant.

Exploration drilling must not take place on the alluvial aquifer. This aquifer is vulnerable to surface sources of contamination, like oil and diesel spills, due to its shallow depth and high permeabilities. Contamination of this aquifer will result in adverse and most probably irreversible impacts on groundwater, as well as the Dwarsrivier and Groot Dwarsrivier.

No groundwater will be abstracted during the drilling programme and water required will be trucked in. For this reason, exploration drilling will not cause a lowering in groundwater levels nor compete with existing groundwater abstraction.

Road construction is not expected to significantly impact on groundwater availability or quality, provided that oil and diesel spills do not occur.

The impact of exploration drilling on groundwater quality and availability is not considered significant due to the limited extent and short duration of activities at each drill pad.

- Oil and diesel spills

Uncontained and unmanaged oil and diesel spills associated with infrastructure development will result in contamination of the underlying aquifers. The shallow weathered and alluvial aquifers are especially vulnerable to groundwater contamination.

- Under-mining of rivers and streams

Available information suggests that rivers and streams will be undermined if the outcome of the proposed exploration programme is positive and underground mining is expanded. A mine plan is not available at present as this will be dependent on the exploration programme outcomes, but it is estimated that the depth of mining would be around 300m below surface.

The results of impact assessments undertaken for the existing underground mining activities (iLEH, 2015) suggests that the most significant impact on the upper weathered and alluvial aquifers is a result of groundwater abstraction for water supply to the mine and not from underground dewatering. The mine is in the process of reducing its dependence on groundwater abstraction from the alluvial aquifer. This water will be partially replaced by water from the WTP. Simulations undertaken as part of the 2015 assessment indicate that the impact of underground dewatering is not uniform across the mining area. In areas of shallower under-mining, groundwater levels in the upper weathered and alluvial aquifers may be lowered by 3 – 4m as a result of underground mine dewatering. In these areas, a reduction in the groundwater component to stream base flow was estimated to be between 18 and 98m^3/d, depending on the depth and extent of mining.

Based on the current understanding of the interaction between the shallow weathered and alluvial aquifers and the underground workings, it is unlikely that mining at depths of 300m and deeper would significantly impact on the overlying rivers and streams. If the groundwater component to stream base flow is to be reduced as a result of mining at these mining depths, the reduction will probably be closer to the lower range reported above, around 20m^3/d. *This assessment will be confirmed upon completion of the detailed groundwater study that is currently underway, which will be included into the final EIA Report.*

A preliminary assessment is therefore presented that the under-mining of rivers and streams will most probably not result in a significant impact over the life of the operations. Post-closure, groundwater levels will recover and residual impacts will reduce with time, most probably within 30 – 80 years of the completion of mining.

Heritage:

From a heritage perspective, areas requiring management were identified, however, none of these will be directly impacted. According to the specialist, the impact of the proposed project on heritage resources can be mitigated and it is recommended that the proposed project can commence on the condition that the recommendations made in this report is implemented as part of the EMPr and based on approval from SAHRA.

General

According to the assessment carried out by the EAP the majority of the impacts can be reduced to a medium to low significance with the appropriate mitigation measures in place. This is specifically due to the fact that the mine has committed to the incorporation of the specialist recommendations into their exploration drilling programme.

The overall project as presented in this report is therefore presented with the view of reducing long term rehabilitation requirements.

The following mitigation measures are crucial and should form part of the Environmental Authorisation to ensure that the applicant manages impacts adequately:

- Ensure that the activities are planned in line with the no-go zones indicated in this document and by the specialist studies – see Section 1.k.ii;
- Ensure that the no-go zones are clearly defined and indicated on the surface layouts and design plans;
- Ensure that all design drawings include effective erosion control measures;
- Adhere to the proposed conceptual Storm Water Management Plan contained in the Hydrological Report and also stipulated in Section 1.g.v.5.
- Adhere to the construction requirements as stipulated in the Freshwater and Aquatic Assessment, in the event that drainage lines require temporary crossings – see Section 1.g.v.5;
- Ensure that training on the EIA and EMPr and the final decision by the DMR is given to all contractors and employees directly involved in the planning, construction and operation of the projects in question;
- Adhere to all management measures and actions presented in this report;
- Demarcate all floral SCC and/ or protected floral species prior to site clearance and apply for the necessary tree and vegetation removal permits;
- No activities which require WULs or approval from the DWS may commence without the necessary authorisations; and
- The rehabilitation of activities on the Two Rivers Platinum Mine surface rights area should be undertaken in consultation with the landowner and signoff upon completion should be obtained from the landowner to indicate agreement with the rehabilitation outcomes.

It should also be noted that the demand for chrome has increased globally due to the increase in China Markets. Not allowing the exploration activities will result in a lost opportunity to understand the optimal mining potential within the area, not only based on economic considerations, but also in terms of safe mining considerations, as the drilling programme will determine the geological structures also present in more detail.

Not allowing activities such as the Truck Parking Area and the new Low-Grade Product Stockpile area, will further lead to a restriction on the volume of this material to be produced and dispatched to the required markets. This will result in restricting the mine to market and supply available reserves, and could impact on the economics of scale of the mining operation.

The Capital Projects and fuel and oil storage project are important to the mine to optimise operational logistics within the Mining Right Area, and by not allowing the formalisation and improvement of activities such as proposed at the Security Access area, North Mine Infrastructure and South Mine Laydown area, would result in a lost opportunity for the mine in terms of continuous improvement.

In conclusion, it is important to take consideration of the manner in which the recommendations by the specialists have been incorporated into and transformed the final project map. The EAP responsible for the compilation of this document and in undertaking the associated Public Participation Process are of the opinion, based on the presented specialist assessments, impact assessment proposed and management plan that the environmental authorisation in support of the Capital Projects and Exploration Drilling Programme can be granted.

Gaps

In each of the specialist reports contained in Annexure 6, the relevant assumptions and gaps have been listed. None of the assumptions listed resulted in uncertainty in terms of the outcomes of the specialist studies and therefore the EAP is confident that the management measures presented in this report will be suitable for achieving the environmental objectives.

The drilling plan as presented in this report is not 100% fixed, and as a result, the temporary access roads cannot be delineated at this time. However, the drilling plan will be restricted to the area of study and drill sites will remain outside of the 1:100 year flood line and buffers as presented in 1.k.ii.

There will always be the possibility of chance heritage findings and for this reason a procedure for such an incident has been included into the management measures.

It is key to note that the outcomes of the location recommendation of the drill site locations as part of this EIA are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensures that the exploration drilling is undertaken to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

The final numerical model was not available for the Draft EIA report, but will be presented upon the submission of the Final EIA report.

Financial Provision

The amount that is required to both manage and rehabilitate the environment in respect of rehabilitation is R27 873 237.30 (excluding VAT) (refer to the table overleaf which indicates the project areas highlighted in grey). Please refer to Annexure 7 for the detailed assessment.

Final Site Map

Activity restrictions are based on:

- 1:100 year flood lines (see Section 1.g.iv.1.g.4);
- Location of heritage buffers;
- Restriction of the Bonheim soils;
- 100m buffer around the Richmond Dam; and
- 32m buffer around riparian zones.

Other considerations would also be:

- To limit any permanent structures on sensitive soil types, such as the Hutton, Arcadia, Rensburg and Bonheim forms (refer to Figure 29 and Figure 30). The impact on these soils have been reduced significantly be excluding the 1:100 year flood lines from the drilling activities. It is important that the project team ensure that these soils are also avoided as far as practically possible with the construction of the temporary access roads. The Capital Projects should not have any negative impacts on the soils.
- Where roads are required for temporary access roads to the drill pads, these should not include excavations of more than $10m^2$ where possible within 32m of watercourses unless approved in terms of the NEMA and NWA;
- No new roads may be constructed within the main river systems (Groot and Klein Dwarsrivier, as well as the Dwarsrivier, or the Springkaanspruit);
- Only existing access roads will be used in the Sekhukhune Mountain Bushveld areas, with specific mention of the steep slopes. Outcrops will be restricted from activities. Where absolutely necessary, tie offs from the existing exploration roads will be constructed to access specific drill points (excluding outcrops again), but these will be designed to be kept to the absolute minimum;
- Where possible drilling in the rocky outcrops (refer to Figure 29) should be avoided if possible, and where critically required the establishment of drill pads should be undertaken in such a manner as to fully rehabilitate this area.

- Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities.
- Activities on fallow lands should be avoided. The area where some drilling (about four boreholes) are planned, are linked to the already approved extension of the Discard Storage Facility footprint and a future Eskom Substation. Any drilling should in these areas be limited to the approved footprints of future infrastructure and not on areas not earmarked for clearance.
- Removal and or destruction of protected and sensitive species (see Figure 58 and Figure 59), especially the Lydenburgia cassinoides, must be avoided at all costs. These species must be demarcated during the planning phase and excluded from any activities or where required specific permits must be obtained where unavoidable. Specific attention should be given around the Truck Parking area, the northern portion of the exploration drilling area, and the south western corner of the exploration drilling area.
- 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 revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.

Please refer to the final draft site map presented in Section 1.k.ii of this report. Note that as part of the exploration programme some of the drilling points may be relocated. However, these relocations will be subject to the above mentioned restrictions.

Environmental Impact Statement

It is the opinion of the EAP that this EIA and EMPr provides the necessary and relevant information required in order to implement the principles of Integrated Environmental Management (IEM) so as to ensure that the best long-term use of the soil, ecological and aquatic resources in the project area will be made in support of the principle of sustainable development. Recommendations of the EAP and specialists have been considered favourably by the applicant and these recommendations have been incorporated into the final project plan. If the proposed management and mitigation measures are not properly applied or if the applicant intentionally disregards any of these measures, it will negatively affect the environment and have potential detrimental consequences. For this reason it is important that the recommendations for conditions for inclusion as presented in Section 1.p.ii.1 be included should the Environmental Authorisation be considered favourably by the Competent Authority.

No fatal flaws, based on the final layout as presented in Section 1.k.ii have been identified.

The following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- Note that laydown areas will only be placed in areas which are demarcated for permanent activity or existing disturbed areas to ensure that no additional areas are disturbed.
- The management measures and actions as presented in the EMPr must be implemented and adhered to on site;
- An Environmental Control Officer (ECO) should be appointed during the construction phases to monitor the implementation of the EMPr;
- The Monitoring Programme and Reporting Programme (internal and external audits) should be adhered to;
- Ensure that the activities are planned in line with the no-go zones indicated in this document and by the specialist studies – see Section 1.k.ii;
- Ensure that the no-go zones are clearly defined and indicated on the surface layouts and design plans;
- Ensure that all design drawings include effective erosion control measures;
- Adhere to the proposed conceptual Storm Water Management Plan contained in the Hydrological Report and also stipulated in Section 1.g.v.5.
- Adhere to the construction requirements as stipulated in the Freshwater and Aquatic Assessment, in the event that drainage lines require temporary crossings – see Section 1.g.v.5;
- Ensure that training on the EIA and EMPr and the final decision by the DMR is given to all contractors and employees directly involved in the planning, construction and operation of the projects in question;
- Adhere to all management measures and actions presented in this report;
- Demarcate all floral SCC and protected flora species prior to site clearance and apply for the necessary tree and vegetation removal permits;

- No activities which requires WULs or approval from the DWS may commence without the necessary authorisations; and
- The rehabilitation of activities on the Two Rivers Platinum Mine surface rights should be undertaken in consultation with the landowner and signoff upon completion should be obtained from the landowner to indicate agreement with the rehabilitation outcomes.

It is recommended that, the proposed development be considered **favourably** provided that the recommended management measures for the identified impacts, monitoring requirements and auditing protocols are adhered to. Construction within the no-go zones must be avoided, and where this is not possible, such as within the 500m buffer around delineated freshwater systems, kept to an absolute minimum and only undertaken with the necessary approval of the DMR and DWS.

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mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

PART A

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

DMR REFERENCE NUMBER MP: LP 30//2/3/2/1(179) EM

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 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process—

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

(b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

(c) identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) Determine the—-

(i) Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) Degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and (cc) can be avoided, managed or mitigated;

(e) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

(g) Identify suitable measures to manage, avoid or mitigate identified impacts; and

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

(i) 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. _____

PART A

SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The application for the Environmental Authorisation Process was submitted to the Department of Mineral Resources (DMR) on 11 April 2018. A letter of acknowledgement from the DMR was received on 24 April 2018. The Final Scoping Report was submitted to the Department of Mineral Resources (DMR) on 18 June 2018 and was acknowledged by the DMR on 26 June 2018.

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

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.a Contact Person and Correspondence Address

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 EAP's experience:

Table 2: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU), now Johannesburg University)	Certified member of the Environmental Assessment Practitioners Association of South Africa (October 2013) 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	14 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
M.Sc. Environmental Management - 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) Board and is also a Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Board of Environmental Assessment Practitioners of South Africa (EAPSA), a legal requirement stipulated by 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 14 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” or “the 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 (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.

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 Grootteboom 373KT		
Postal address:	PO Box 567, Lydenburg		
Postal code:	1120	Cell:	+27 (0) 082 863 6633
Telephone:	+27 (0) 13 230 5300	Fax:	+27 (0) 13) 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	National Water Act, 1998 (NWA)	Regulation 4b (GN704) Exemption for undermining 2006	16/2/7/B400/C83/1	12 September 2006
3	NWA	Overall Water Use Licence (WUL)	16/2/7/B400/C83	21 January 2008
4	NWA	WUL – Tailings Dam	04/B41G/G/792	8 July 2011
5	National Environmental Management Act, 2004 (NEMA)	Environmental Authorisation for the proposed construction of a new Tailings Storage Facility	12/1/9-7/1e/GS4	9 July 2011
6	MPRDA	Dwarsrivier Mine Tailings Storage Facility Environmental Management Programme	LP30/5/1/3/2/1(179)EM	22 August 2011
7	National Environmental Management: Waste Act, 2008 (NEM:WA)	Waste Licence – Hazardous Waste Temporary Storage Facilities[1];	12/9/11/L290/5	21 July 2011
8	MPRDA	Approval for Three Plants	LP30/5/1/3/2/1 (179)EM	11 January 2012
9	NEM:WA	Waste Licence – Temporary General Waste Storage Facilities	12/4/10-A/1/GS3	29 March 2012
10	NEMA	Construction of a Low-Level Bridge over the Groot Dwarsrivier	12/1/9/1-GS22	11 June 2012
11	NEMA	Environmental Permission for Construction of a Bridge over the Springkaanspruit River	12/1/9/1-GS62	19 September 2013
12	NWA	WUL – River Crossings	04/B41G/CI/2240	4 October 2013
13	NEMA	Section 24G Rectification	12/1/9-7/S24G/7-GS1	26 August 2014
14	NEM:WA & NEMA	Integrated Environmental Authorisation	179EM	15 February 2018

The decommissioning of the diesel tanks are for the existing activities addressed in the approved Environmental Management Programme (EMPr), 2010 and the Section 24G Rectification approval, 2014 (see highlights above).

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) and Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT, as well as Portion 4 (a portion of Portion 3) of the farm De Grootteboom 373KT.

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

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 and Figure 2 illustrating the location and cadastral setting of the mine.

Dwarsrivier Mine falls in the quaternary catchments B41G and B41H in the Olifants Water Management Area (WMA B4). All surface water draining from the properties ultimately flows into the Groot Dwarsrivier and the Klein Dwarsrivier, the confluence of which is located on northwestern 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.

[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.

Several of the neighbouring farms, namely Tweefontein 380JT, Thorncliffe 374KT, De Grootteboom 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 land.

Table 5: Property Information

Farm Name:	• Farm Dwarsrivier 372KT Portion 0 (Remaining Extent) • Farm Dwarsrivier 372KT Portion 1 (Remaining Extent) • Farm De Grootteboom 373KT Portion 4 (a Portion of Portion 3) • Farm Dwarsrivier 372KT Remainder of Portion 6 • Farm Dwarsrivier 372KT Remainder of Portion 7
Magisterial district:	The mine falls within the Fetakgomo-Greater Tubatse Local Municipality, within the boundaries of the Sekhukhune 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 of Portion 1 - T0KT00000000037200000 • Farm Dwarsrivier 372KT Portion 1 - T0KT00000000037200001 • Farm De Grootteboom 373 KT Portion 4 (a Portion of Portion 3) - (T0KT00000000037300003) • Farm Dwarsrivier 372KT Remainder of Portion 6 - T0KT00000000037200006 • Farm Dwarsrivier 372KT Remainder of Portion 7 - T0KT00000000037200007 Title Deeds are attached in Appendix 2.

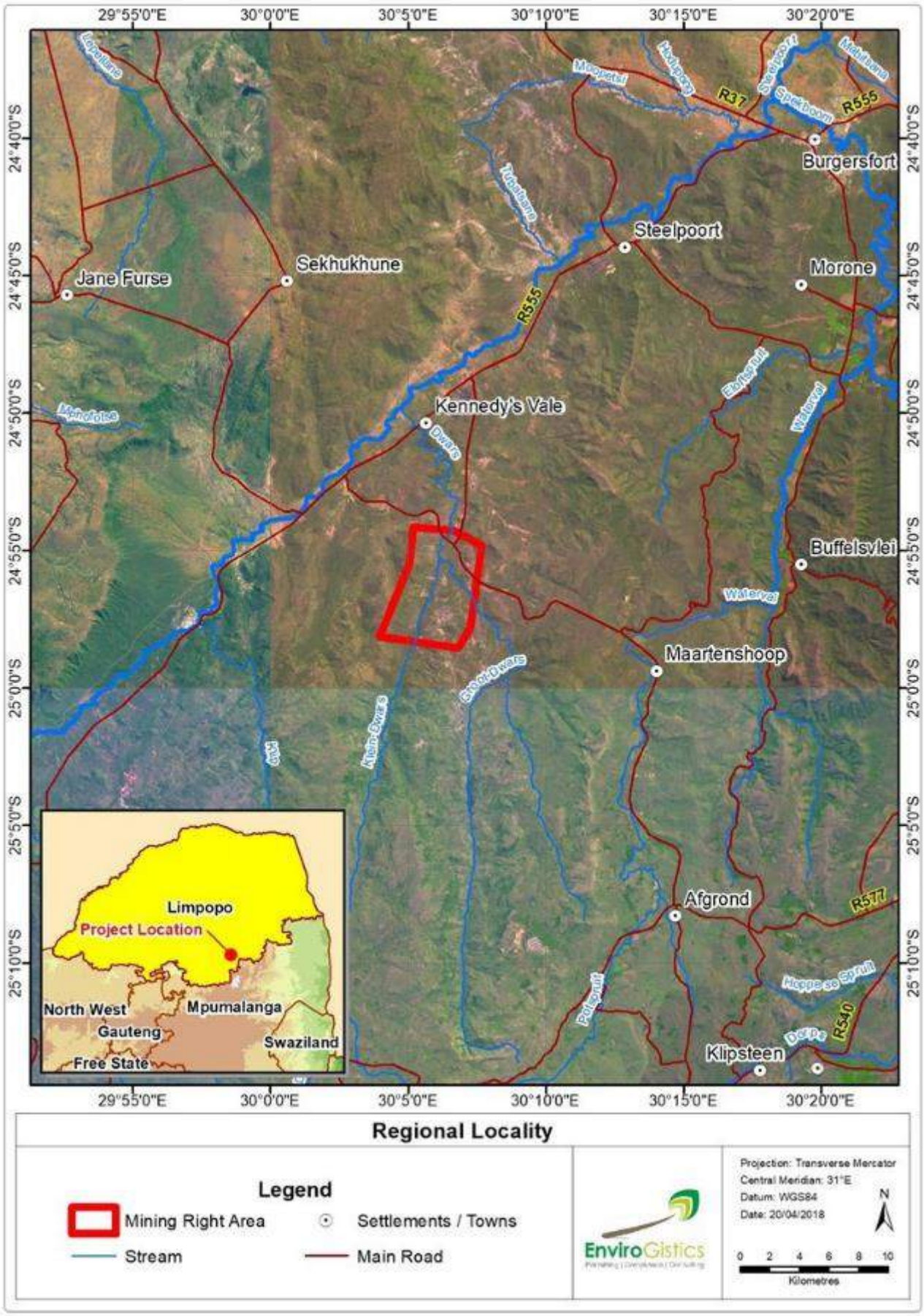


Figure 1: Local and Regional Setting of the Dwarsrivier Mine surface operations

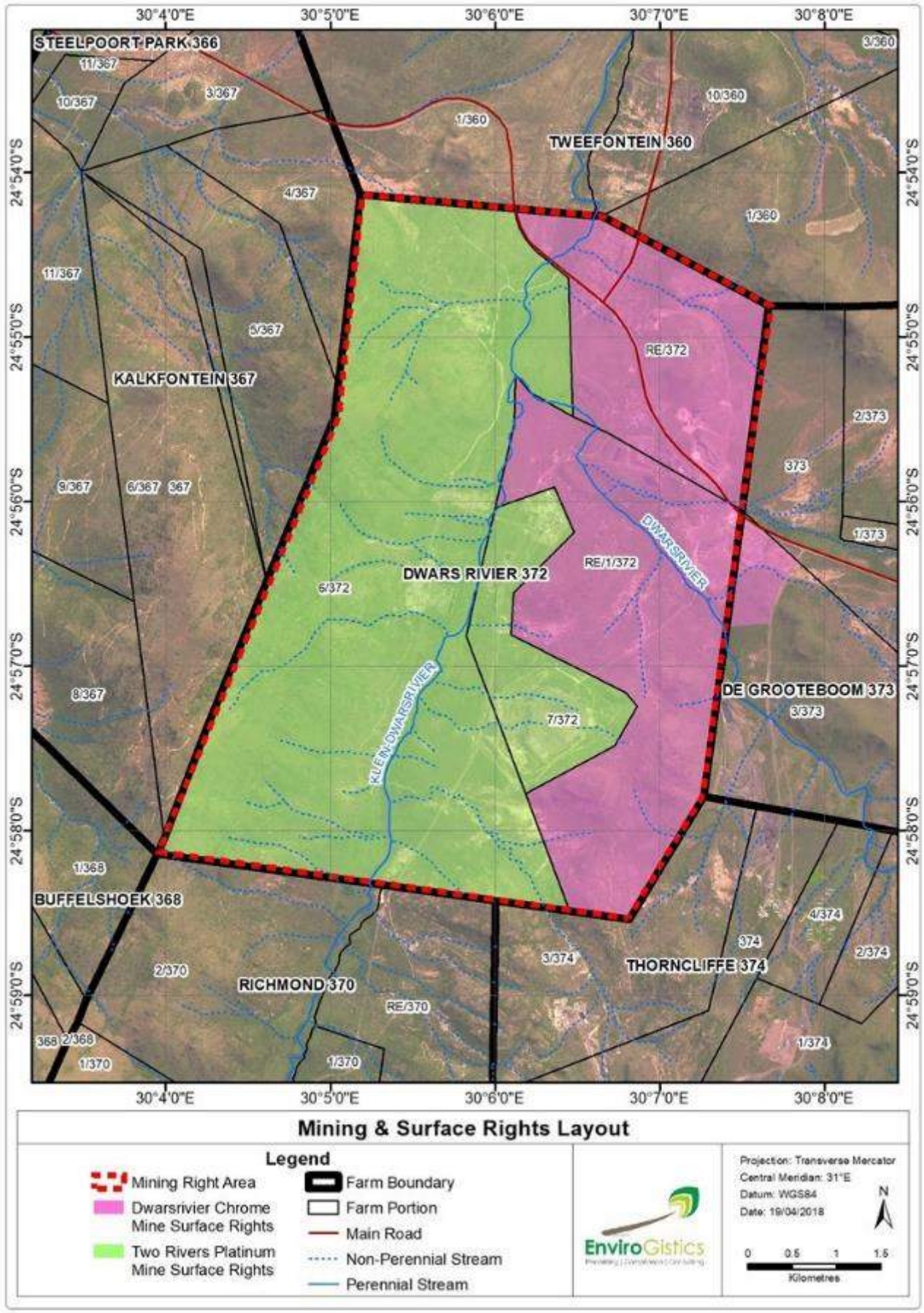


Figure 2: Cadastral Information

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) 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 (Portions 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 Grootteboom 373KT, subdividing this portion into Portion 4 (a portion of Portion 3).

The mine holds the surface rights on Portion 1 (Remaining Extent), Portion 0 (Remaining Extent) of the farm Dwarsrivier 372KT and Portion 4 (a Portion of Portion 3) of the farm De Grootteboom 373KT. The mining rights are held over Portion 1 (Remaining Extent), Portion 0 (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	T129310/1998	489.1915ha	Assmang (Pty) Ltd	Assore Ltd
Dwarsrivier 372KT	1	T129310/1998	842.6880ha	Assmang (Pty) Ltd	Assore Ltd
De Grootteboom 373KT	Portion 4 (a Portion of Portion 3)	T78889/2002	52,1993ha	Assmang (Pty) Ltd	Assore 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

A Section 11 transfer in terms of the MPRDA has been applied for whereby Assore takes over all administrative and technical services, as well as the sales and marketing function. This application has been successful and therefore Assore is now 100% owners of Dwarsrivier Mine in terms of the mining rights. Surface rights are currently still being held by Assmang (Pty) Ltd.

1.c Locality Map

Figure 3 and Figure 4**Error! Reference source not found.** 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 Portion 0 (RE):
	  ○ North Shaft Diesel supply pipelines for underground supply
	  ○ North Shaft Fuel and Oil Storage
	  ○ Low Grade Product Stockpile
	  ○ North Shaft Infrastructure (roads, offices and change houses)
	  ○ Truck Parking Area
	  ○ Exploration Drilling (access roads and approximately 25 drill pads)
	• Farm Dwarsrivier 372KT Portion 1 (RE):
	  ○ South Mine Bulk Fuel and Oil Storage
	  ○ South Mine Main Stores Fuel and Oil Storage
	  ○ South Mine Laydown Area
	  ○ Treated Water Reservoir
	  ○ Main Plan Fuel and Oil Storage
	  ○ Exploration Drilling (access roads and approximately 30 drill pads)
	  ○ Expansion of the existing Topsoil Area
	• Farm De Grootteboom 373 KT Portion 4:
	  ○ Security Office Upgrades
	• Farm Dwarsrivier 372KT Remainder of Portion 6:
	  ○ Exploration Drilling (access roads and approximately 250 drill pads)
	• Farm Dwarsrivier 372KT Remainder of Portion 7:

	○ Exploration Drilling (access roads and approximately 40 drill pads)
Application area (hectares)	Farm Dwarsrivier 372KT RE: ○ North Shaft Diesel supply pipelines for underground supply (9.8ha) ○ North Shaft Fuel and Oil Storage (within the existing laydown area) ○ Low-Grade Product Stockpile (2ha) ○ North Shaft Infrastructure (roads, offices and change houses) (within existing infrastructure area, overall area approximately 5.6ha) ○ Truck Parking Area (3ha) ○ Exploration Drilling (access roads and approximately 24 drill pads) – about 1ha clearance for drill pads and about 0.6ha clearance for roads) Application area: approximately 21ha Farm Dwarsrivier 372KT Remainder of Portion 1: ○ South Mine Bulk Fuel and Oil Storage (minimum clearance required, area will cover 0.21ha) ○ South Mine Main Stores Fuel and Oil Storage (within existing Workshop area) ○ South Mine Laydown Area (2.8ha) ○ Treated Water Reservoir (within the Ceramic Filtration (CFM) Plant area, previously used for a contractors area, overall area of 0.1ha, but within an existing area) ○ Main Plant Fuel and Oil Storage (within area approved for clearance, overall area of about 0.51ha) ○ Exploration Drilling (access roads and approximately 44 drill pads) – about 2ha clearance for drill pads and about 2.6ha clearance for roads) ○ Expansion of the Existing Topsoil Area (0.6ha) Application area: approximately 9ha Farm De Grootteboom 373KT Portion 4: ○ Security Office Upgrades (1.8ha) Application area: approximately 1.8ha Farm Dwarsrivier 372KT Remainder of Portion 6: ○ Exploration Drilling (access roads and approximately 217 drill pads) – about 9ha clearance for drill pads and about 20ha for clearance for roads) Application area: approximately 30ha Farm Dwarsrivier 372KT Remainder of Portion 7: ○ Exploration Drilling (access roads and approximately 38 drill pads) – about 1.5ha clearance for drill pads, and about 2.2ha clearance for roads Application area: approximately 4ha
Overall Clearance	Approximately 65ha

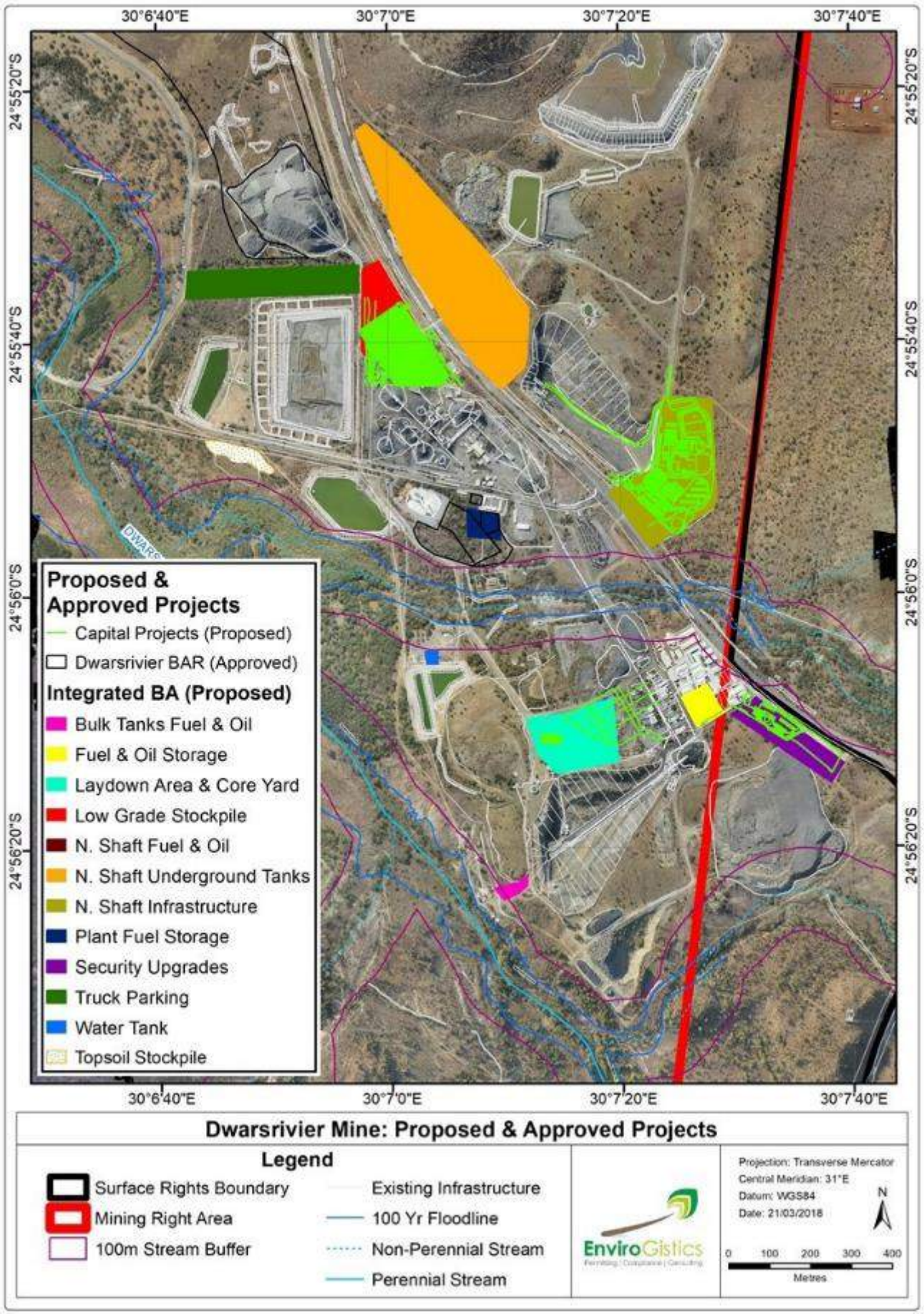


Figure 3: Location of Activities – Capital Projects

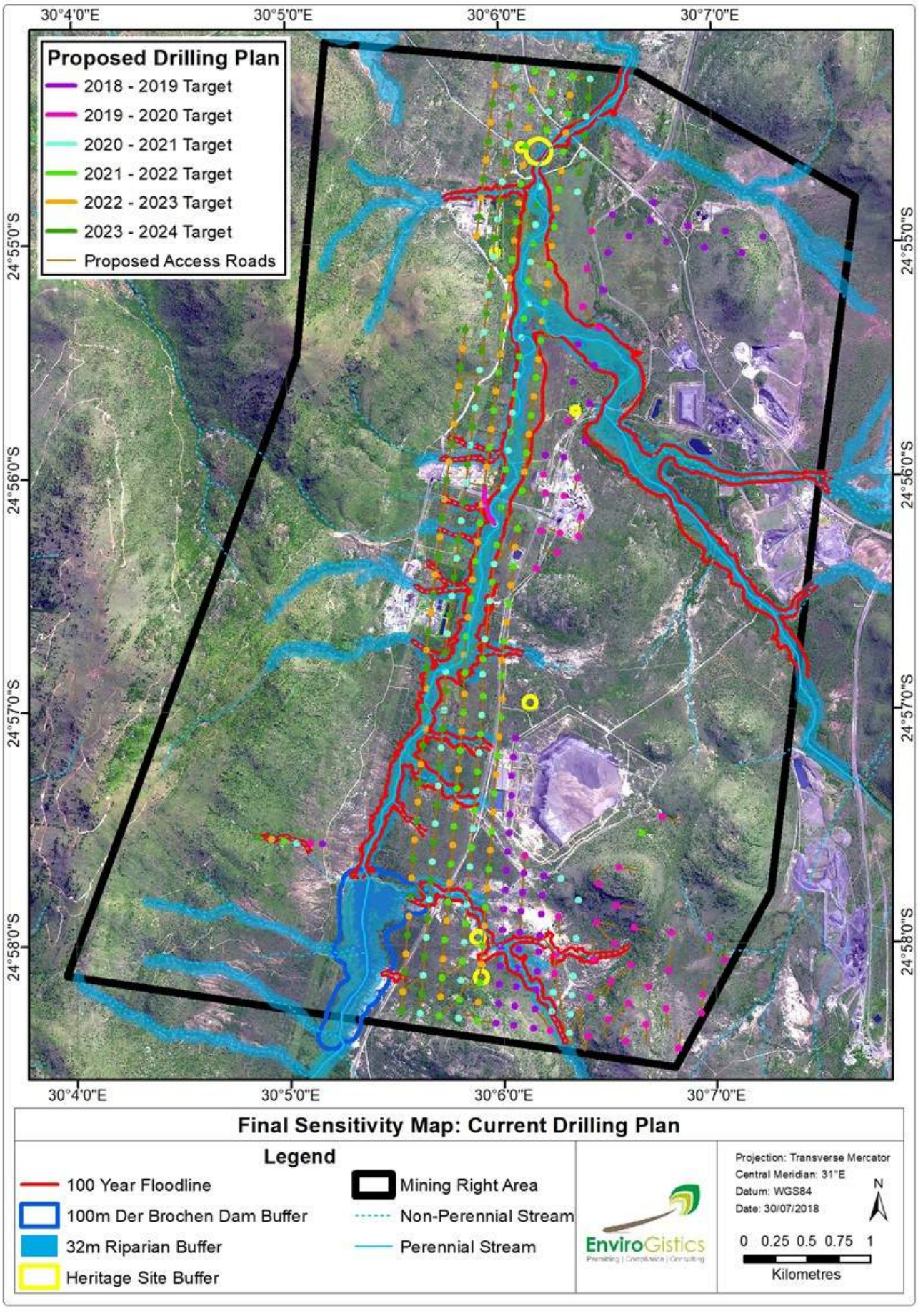


Figure 4: Location of Activities – Exploration (prior to exclusions)

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: Resource and Reserve Mapping which includes the construction of roads, 'drilling pads' and the clearance of vegetation;
- Project 2: The development of a number of Capital Projects, including a new Metallurgical Low-Grade Stockpile Area, the expansion of the existing Topsoil Stockpile area at South Mine, development of a Truck Parking Area, development of a laydown area, establishment of a reservoir and the expansion of the North Shaft Infrastructure (new change house, pipelines supplying diesel to underground operations, etc.);
- Project 3: Diesel Storage which entails the decommissioning of existing tanks and the establishment of new facilities (total capacity of 295m^3); and
- *Project 4: Discharge of water. The mine intends to discharge fissure water captured in the underground workings into the Groot Dwarsrivier.* **Subsequent to the Scoping Report, this project has been excluded from the current Environmental Authorisation Process. Further hydrological and aquatic studies are required to determine the impact of the discharge onto the Dwarsrivier system**.

Please refer to Figure 3 and **Error! Reference source not found.**Figure 4 (also consider Figure 82) for the location of the proposed activities.

The following sections present a detailed description of each of the projects.

1.d.i Listed and Specific Activities

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

In terms of the National Environmental Management Act (Act No. 107 of 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 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.

Considering the above, the following listed activities may be triggered:

NEMA Government Notice 983, 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.
- 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.
- 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.
- 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.
- Activity 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required.

- Activity 31: The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice.
- Activity 34: The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding— (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies.

NEMA Government Notice 984, Listing Notice 2:

- Activity 6: The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.
- 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.

NEMA Government Notice 985, Listing Notice 3:

- Activity 2: The development of reservoirs excluding dams, with a capacity of more than 250 cubic metres.
- Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres.
- 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.
- 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.
- 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; (b) in front of a development setback, or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.

Note that the activities are discussed in detail in Table 8.

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 deal 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 deals 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 (NEM:WA)

Considering the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM:WA), 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.

No waste activities are planned in terms of the project. Sumps will be present at the drilling sites, but these will be mobile and of a temporary nature to contain any dirty water arising from the drilling activities. Dirty water will be disposed of in terms of legal practices to a licensed facility.

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

Chapter 4 of the National Water Act (Act No. 36 of 1998) (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 WULs, due to the following:

- Section 21c&i applications for exploration roads, where these may cross non-perennial drainage channels;
- Section 21b for the storage of water;
- GN704 exemption for the location of infrastructure within the 100m buffer from watercourses, this may be for the Truck Parking, Product Stockpile and Exploration Activities;
- GN704 exemption for the use of discard rock from the Discard Storage Facility in the construction of berms, roads and parking areas; and
- Section 21g for the construction of the Product Stockpile.

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

Table 8: Listed Activities

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*	Waste Management Authorisations
Resource and Reserve Drilling				
Construction of roads to access the drill sites. (Roads will be of a temporary nature for access to drill sites at a width of approximately 6m wide. Various drainage channels are present in this area, which will have to be crossed to access the required sites. It is unlikely that large scale excavation will be required for the construction of the roads.) It is unlikely that large scale excavation will be required for the construction of the temporary roads. The project will ensure that road development will be scheduled to occur, as far as practically possible, during the dry seasons. Where possible existing roads will be utilized. No additional road crossings will be constructed over the main river systems (Groot or Klein Dwarsrivier or the Springkaanspruit). Where roads are required over non-perennial drainage lines, these will be applied for with the DWS.	25ha (Roads and drill pads with a combined area of about 40ha). Roads will be more than 35km in combined length.	x	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 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. (32m from watercourse).* **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 3, Activity 14**: The development of (xii) infrastructure 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.	**Not Applicable (N/A)**
Construction of drill pads (at about 323 sites). Drill pads will be 20m x 20m each in extent and will comprise of the drill site and a portable sump/ container for the storage of dirty water originating from the drilling activities. Temporary offices may also be erected if and when required. Small scale diesel/ lubrication/ oil storage may be required for the drill rigs, although the specific volumes cannot be determined at this time. Therefore provision has been made for the minimum listing notice trigger. The drill sites will be located outside of the 1:100 year flood lines.	13ha (The combined area of roads and drill pads combined at about 40ha).	x	**Listing 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 1: Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. **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. **Listing 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 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.	N/A There will be portable containment trays (2m x 2m x 2m) for the storage of the contaminated water (containing hydrocarbons and greases). No permanent or temporary storage areas will be constructed.

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*	Waste Management Authorisations
Capital Projects				
Low-Grade Stockpile (no additional roads will be required, as the entire area will be located within the plant area on a concreted surface). This facility may be located within the 100m buffer of the diverted non-perennial drainage line.	2ha of which 1.5ha clearance is required.	x	***Listing 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. (32m from watercourse).* **Listing 1, Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 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. **Listing 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 3, Activity 14**: The development of (xii) infrastructure 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.	**N/A**
North Mine Infrastructure (the project will include the construction of roads, traffic circles around the infrastructure areas, buildings such as a change house and fences). Note that the buildings are the formalisation of existing areas and no additional clearance is required. Clearance will only take place around specific areas surrounding the road construction. Roads will be between 6m and 8m in width depending on whether these are single lanes or double lanes.	2.8ha of which only 0.7ha clearance will be required.	x	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.	**N/A**
South Mine Truck Parking This activity will require the relocation of Topsoil Stockpile #4. This material will either be relocated to Topsoil Stockpile #3 or be used in ongoing rehabilitation activities around South Mine. No river crossing is required. The facility will however be located within the 100m buffer of the drainage line (remnants of the diverted drainage line, but still conveying water during rain events).	3ha	x	**Listing 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 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.	N/A

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*	Waste Management Authorisations
A turnaround area (traffic circle) inside the mine property will be required to allow for trucks to be withheld if not compliant with safety and environmental standards, the internal road will not be wider than 4 m, and only one way up until the Truck Parking. A two way lane at 3.5m each (7m in total) from the Truck Parking to the final exist will be required.			**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 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.	
South Mine Laydown Area, including the core yard, which will include an access road.	2.8ha	x	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.	N/A
Treated Water Reservoir (900m³). This facility will be located within existing disturbed areas.	0.5ha (no clearance required).	x	**Listing 3, Activity 2:** The development of reservoirs excluding dams, with a capacity of more than 250 cubic metres.	N/A
Security Office Upgrades. New security office (brick building with steel roof). Road of 250m in length with a maximum width of 8m.	No clearance required.	x	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres.	N/A
Fuel and Oil Storage and Supply to North Underground Mine. Two 23m³ storage tanks with associated pipes are required. Pipelines will be required to supply fuel to underground operations. These will be small diameter pipelines with flow meters attached.	Supply area: 9.8ha (a maximum area of 0.05ha clearance will be required – 500m²). 2 x 23m³ tanks in diesel bunded area, with steel pipes supplying underground workshops	x	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except 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.	N/A

Name of Activity	Aerial extent of the Activity (Ha or m²)	Listed Activity (Yes = "x")	Applicable Listing Notice (*Listing Notice 1 (GNR 983), Listing Notice 2 (GNR 984) or Listing Notice 3 (GNR 985)*) *Note that Listing Notice 3 is applicable in this event as the activities will be located in a CBA Category 1 area, as well as certain areas in critically endangered ecosystems.*	Waste Management Authorisations
Note, that the exact design and layout of this area has not been finalised and therefore the clearance of the area is still considered a listed activity.	through a cemented tunnel.		**Listing 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.	
Expansion of the existing Topsoil Stockpile at South Mine.	0.6ha	x	**Listing 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.	
Fuel and Oil Storage and Supply				
The existing diesel storage areas will be decommissioned and replaced by new facilities. This storage of fuels and oils will be located within existing disturbed areas. a. Decommissioning of existing tanks at South Mine (TMM Workshop and Bulk supply). b. Establishment of new facilities (total capacity of 295m³). No additional clearance activities are required.	No additional clearance – replacement of existing sites.	x	**Listing 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. **Listing 1, Activity 31:** The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice. **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.	N/A
General				
Overall Clearance	65ha	x	**Listing 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.	-

1.d.ii Description of the Projects to be undertaken

1.d.ii.1 Project 1: Resource and Reserve Drilling

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

Table 9: Project 1: Resource and Reserve Mapping

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
Drill Sites Drill pads will be 20m x 20m each and will comprise of the drill site and a portable bund for the storage of dirty water originating from the drilling activities. Temporary offices may also be erected if and when required. The drill sites will be located outside of the 1:100 year flood lines.	13ha	323 drill pads at 20 x 20m each	The following coordinates present the corner points of the exploration area: 24°54'14.61"S 30°6'0.26"E 24°54'17.56"S 30°6'26.82"E 24°55'0.15"S 30°7'14.37"E 24°55'5.12"S 30° 6'32.58"E 24°56'15.06"S 30°6'22.45"E 24°56'32.74"S 30°6'3.85"E 24°57'33.63"S 30°6'1.60"E 24°57'42.29"S 30°6'17.88"E 24°57'22.39"S 30°6'46.49"E 24°57'57.29"S 30°6'45.21"E 24°58'3.31"S 30°7'3.77"E 24°58'28.20"S 30°6'48.87"E 24°58'26.25"S 30°6'17.65"E 24°58'17.47"S 30°5'30.95"E 24°56'33.58"S 30°5'40.02"E	**Listing 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 1: Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. **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. **Listing 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 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.
Temporary Access Roads (Roads will be of a temporary nature for access to drill sites at a width of approximately 6m wide. Various drainage channels are present in this area, which will have to be crossed to access the	25ha	Combined Length of approximately 35km. Width of roads at 6m.	Shortest possible route, with minimum clearance between drilling sites. Within coordinates provided for the drill sites (above).	**Listing 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 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*

Description	Footprint Size	Dimensions	Coordinates	Listed Activities triggered
required sites. It is unlikely that large scale excavation will be required for the construction of the roads.) It is unlikely that large scale excavation will be required for the construction of the temporary roads. The project will ensure that road development will be scheduled to occur, as far as practically possible, during the dry seasons. Where possible existing roads will be utilized. No additional road crossings will be constructed over the main river systems (Groot or Klein Dwarsrivier or the Springkaanspruit). Where roads are required over non-perennial drainage lines, these will be applied for with the DWS.				*or rock of more than 10 cubic metres from a watercourse. (possibly depending on the outcomes of specialist studies)* **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 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.

1.d.ii.1.a Location

As exploration is a dynamic process as part of the operational phase of the mine, an exploration programme has been developed to consider the possible area over a period of five (5) years. It is planned that exploration drilling will take place at the following areas:

- Farm Dwarsrivier 372KT Portion 0: Exploration Drilling (access roads and approximately 24 drill pads);
- Farm Dwarsrivier 372KT Remainder of Portion 1: Exploration Drilling (access roads and approximately 44 drill pads);
- Farm Dwarsrivier 372KT Remainder of Portion 6: Exploration Drilling (access roads and approximately 217 drill pads); and
- Farm Dwarsrivier 372KT Remainder of Portion 7: Exploration Drilling (access roads and approximately 38 drill pads).

The exploration activities are planned over the Dwarsrivier Mine Mining Rights, however, this will extend onto the Two Rivers Platinum Mine Surface Rights, which includes the Two Rivers Platinum Mine Plant area, as well as Tailings Storage Facility (TSF) area. For the TSF, the exploration programme will ensure that the required risk assessments be undertaken prior to initiating the exploration programme and were required the necessary buffers or measurs will be implemented as agreed to between the two mines. Where infrastructure is present, consultation with the landowner will be undertaken and drilling will only be conducted in approved areas and in line with the landowners' rules and requirements.

As the mine is located in a mountainous area, various drainage lines are present. For this purpose and also to accommodate the drilling programme, the drill sites located within flood lines will only be accessed during the dry period. This will have a dual purpose of improved access, as well as a lesser potential impact on the water systems within such areas. A meeting took place with the Department of Water and Sanitation on 10 July 2018 in Lydenburg to discuss specific departmental requirements (please refer to Annexure 4 for minutes of the meeting).

Another consideration is the presence of the Richmond Dam in the south of the mine and in close proximately to the exploration activities. A buffer will also be retained around this facility as per the recommendations of the specialists.

Figure 5: Location of Drilling Activities (pre specialist studies)

The following map indicates the location of the exploration sites, based on:

- Heritage buffers;
- Floodline buffers;
- Wetland buffers; and
- Infrastructure buffers.

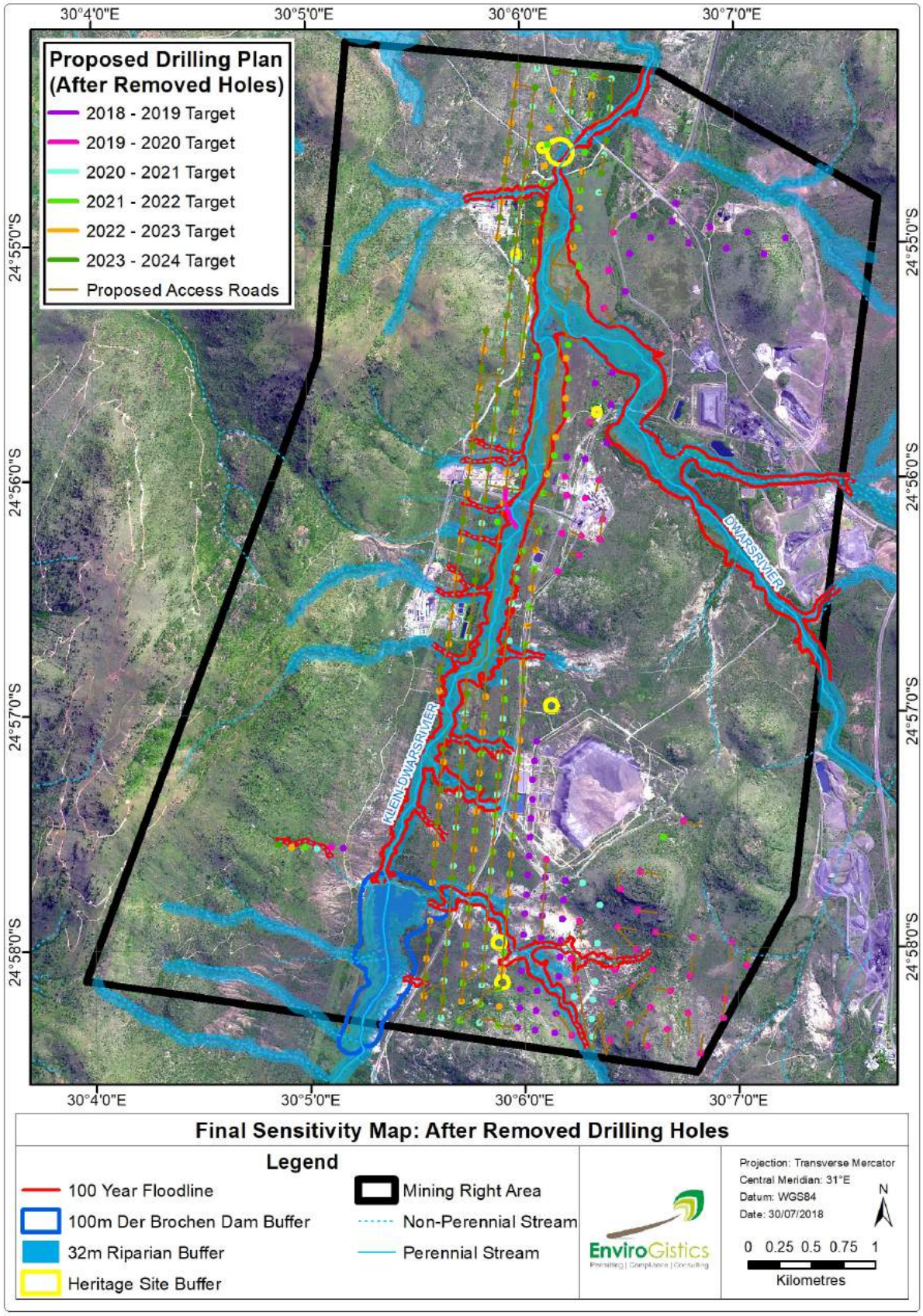


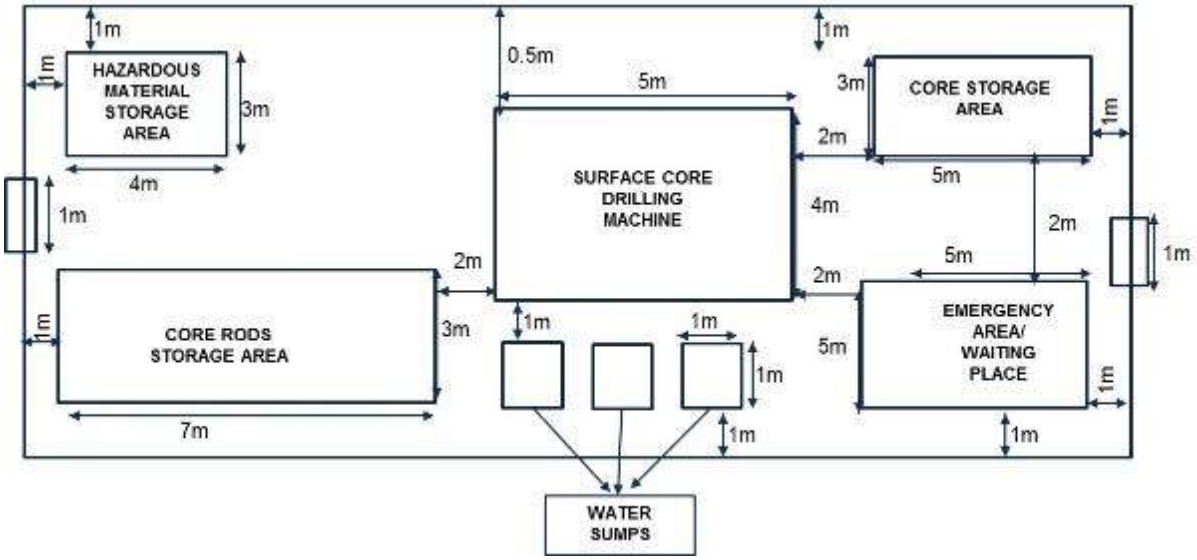
Figure 6: Final layout of Drilling Activities

1.d.ii.1.b Operational Setting

Overall approximately 323 drilling sites are planned over the next five (5) years. Each drill site is about 400m^2 (20m x 20m) in size. A typical drill site will comprise of:

- Access roads (will not exceed 6m in width);
- Drill pad;
- Core bay;
- Water tank;
- Portable toilets;
- Temporary offices;
- Dangerous goods storage (diesel/lubrication/oils); and
- Temporary parking area for vehicles.

Please refer to the following illustration for a typical layout of such a site:



Graph 1: Typical Drill Site

It is planned that for the first two (2) year about 8-10 drilling machines will be active on site at any given time. After the initial two (2) year period, the number of drilling machines should be reduced to about four (4) machines at any given time. The increased number of drilling machines during the first two (2) years is to make up for time lost during the preceding years due to planning and permitting requirements. Activities are generally planned for a period of 14-21 days per drill site, whereafter the area is to be rehabilitated and the next site developed. The drilling activities will be to a maximum depth of 600m, depending on the geological topography. The drilling activities will at no time overlap with the Two Rivers Platinum drilling plan.

It should be noted that although ongoing rehabilitation will be undertaken at the drill sites, the roads will be left up until an area has been fully explored in terms of the programme.

1.d.ii.2 Project 2: Capital Projects

The mine is planning on improving the logistical layout within the mining area, which will require the establishment of additional infrastructure and services. These are discussed in further detail in the sections hereafter:

Table 10: Project 2: Capital Projects

Description	Footprint Size	Dimensions/Details	Coordinates	Listed Activities triggered
Low-Grade Stockpile (no additional roads will be required, as the	2ha of which 1.5ha clearance is required.	Concreted bunded area, within overall Plant area.	Corner points: 24°55'41.28"S 30° 6'58.16"E	***Listing 1, Activity 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging,*

Description	Footprint Size	Dimensions/Details	Coordinates	Listed Activities triggered
entire area will be located within the plant boundary on a concreted surface). Listing 2 is included as the DWS indicated that the product stockpiles should be licensed as S21g water uses. Note that this stockpile is to be located on a concreted area. All dirty water runoff reports to the Lower Return Water Dam (RWD). This facility may be located within the 100m buffer of the diverted non-perennial drainage line.		Project will consist of conveyors and transfer points. Maximum height of stockpile: 20m.	24°55'34.07"S 30° 6'57.71"E 24°55'33.45"S 30° 6'59.34"E 24°55'39.68"S 30° 7'3.21"E 24°55'41.23"S 30° 6'58.71"E	*excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse. (32m from watercourse).* **Listing 1, Activity 27**: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 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. **Listing 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 3, Activity 14**: The development of (xii) infrastructure 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.
North Mine Infrastructure (the project will include the construction of roads, traffic circles around the infrastructure areas, buildings such as a change house and fences). Note that the buildings are the formalisation of existing areas, and no clearance is required. Clearance will only take place around specific areas surrounding the road construction. Roads will be between 6m and 8m in width depending on whether these are single lanes or double lanes.	2.8ha of which only 0.7ha clearance will be required.	One way roads: 6-8m wide (total length of 920m). Two way roads: 8m wide (total length of 160m). Brick buildings with steel roofs. Paved walkways. Paved roads (should exemption be obtained for the use of discard rock as surface material in terms of GN704, this option will be preferred over paved roads).	Corner points: 24°55'52.01"S 30° 7'18.78"E 24°55'50.23"S 30° 7'22.84"E 24°55'44.55"S 30° 7'23.75"E 24°55'44.56"S 30° 7'28.20"E 24°55'53.39"S 30° 7'28.40"E 24°55'56.52"S 30° 7'22.63"E	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.
South Mine Truck Parking This activity will require the relocation of Topsoil Stockpile #4. This material will either be relocated to Topsoil Stockpile #3 or be used in ongoing rehabilitation	3ha	1ha clearance for the truck parking; Road A with a length of 1100m; and Access Roads between 300-370m in length. Truck parking and roads will be	Approximate Centre Coordinate: Option 1: 24°55'35.39"S 30° 6'49.84"E Access Road approximate entrance: 24°55'34.54"S 30° 6'43.44"E	**Listing 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 1, Activity 24**: The development of a road with a reserve wider than 13,5 meters,

Description	Footprint Size	Dimensions/Details	Coordinates	Listed Activities triggered
activities around South Mine. No river crossing is required. The facility will however be located within the 100m buffer of the drainage lines defined in the flood line study. A turnaround area (traffic circle) inside the mine property will be required to allow for trucks to be withheld if not compliant with safety and environmental standards, the internal road will not be wider than 4 m, and only one way up until the Truck Parking. From the Truck Parking to the final exit the road will be a two way direction lane at 3.5m each (7m in total). The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes will not be required.		surface with discard rock (depending on approval of GN704 exemption for Regulation 5).		or where no reserve exists where the road is wider than 8 metres; but excluding a road — which is 1 kilometre or shorter. **Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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 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.
South Mine Laydown Area, including the core yard.	2.8ha	0.15ha Core Shed (brick building with steel roof). Access road will be less than 1km in length with a width of less than 4m. The laydown area will comprise the remainder of the area, with specific clearance of 1.1ha.	Corner points: 24°56'7.48"S 30° 7'20.46"E 24°56'9.96"S 30° 7'11.72"E 24°56'12.50"S 30° 7'12.49"E 24°56'15.14"S 30° 7'12.09"E 24°56'13.46"S 30° 7'19.95"E	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity. **Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres. **Listing 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.
Treated Water Reservoir (900m^3).	0.5ha	900m^3 Round Steel Tank.	Centre Point: 24°56'5.07"S 30° 7'3.71"E	**Listing 3, Activity 2**: The development of reservoirs excluding dams, with a capacity of more than 250 cubic metres.
Security Office Upgrades	No clearance required.	New security office (brick building with steel roof). Road of 250m in length with a maximum width of 8m.	Corner points: 24°56'9.52"S 30° 7'29.53"E 24°56'8.29"S 30° 7'31.75"E 24°56'13.47"S 30° 7'39.34"E 24°56'15.07"S 30° 7'38.19"E	**Listing 3, Activity 4**: The development of a road wider than 4 metres with a reserve less than 13,5 metres.

Description	Footprint Size	Dimensions/Details	Coordinates	Listed Activities triggered
Expansion of existing Topsoil Stockpile #3	0.6ha expansion – total area of approximately 1.3ha (includes the existing Topsoil Stockpile).	Maximum height of 4m.	Corner points: 24°55'48.96"S 30° 6'45.06"E 24°55'47.39"S 30° 6'44.10"E 24°55'48.57"S 30° 6'48.66"E 24°55'50.03"S 30° 6'50.25"E 24°55'50.61"S 30° 6'49.80"E 24°55'49.45"S 30° 6'47.75"E	**Listing 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.
North Shaft Diesel supply pipelines for underground supply. Note, that the exact design and layout of this area has not been finalised and therefore the clearance of the area is still considered a listed activity.	Supply area: 9.8ha (a maximum area of 0.05ha clearance will be required – 500m^2).	2 x 23m^3 tanks in diesel bunded area, with steel pipes supplying underground workshops through a cemented tunnel.	Centre Point: 24°55'34.47"S 30° 7'5.44"E	**Listing 1, Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except 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. **Listing 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.2.a Low-Grade Product Stockpiles

The current stockpile footprints of both the low-grade and high-grade material are not sufficient to accommodate additional stockpile requirements. This specifically occurred during 2017, when sufficient capacity was not available at the ports to store product, which in turn resulted in a chain reaction on site.

The need for extension of the stockpile capacity at the plant is of critical importance to ensure flexibility in supply of chrome at the mine. The design of the facility must allow for the storage of three (3) months' production capacity based on a total of 1.7 million tons product produced per annum.

Based on the above it is proposed that additional stockpiles to accommodate 55 000 tons of low-grade material at the mine be constructed. This will include three (3) new stockpiles and boom stackers and the upgrade of the existing stockpile system.

The site will be located within the South Plant area but will extend 1.5ha into an area previously not cleared.

Photo 1: Area where vegetation clearance to accommodate the Low Grade Stockpile will take place

The overall site will be located on a concrete footprint with storm water management systems linking to the existing drainage system on site. All dirty water will report to the lower Return Water Dam (RWD). Please refer to the follow diagramme for the layout of the stockpile system in relation to the existing plant.

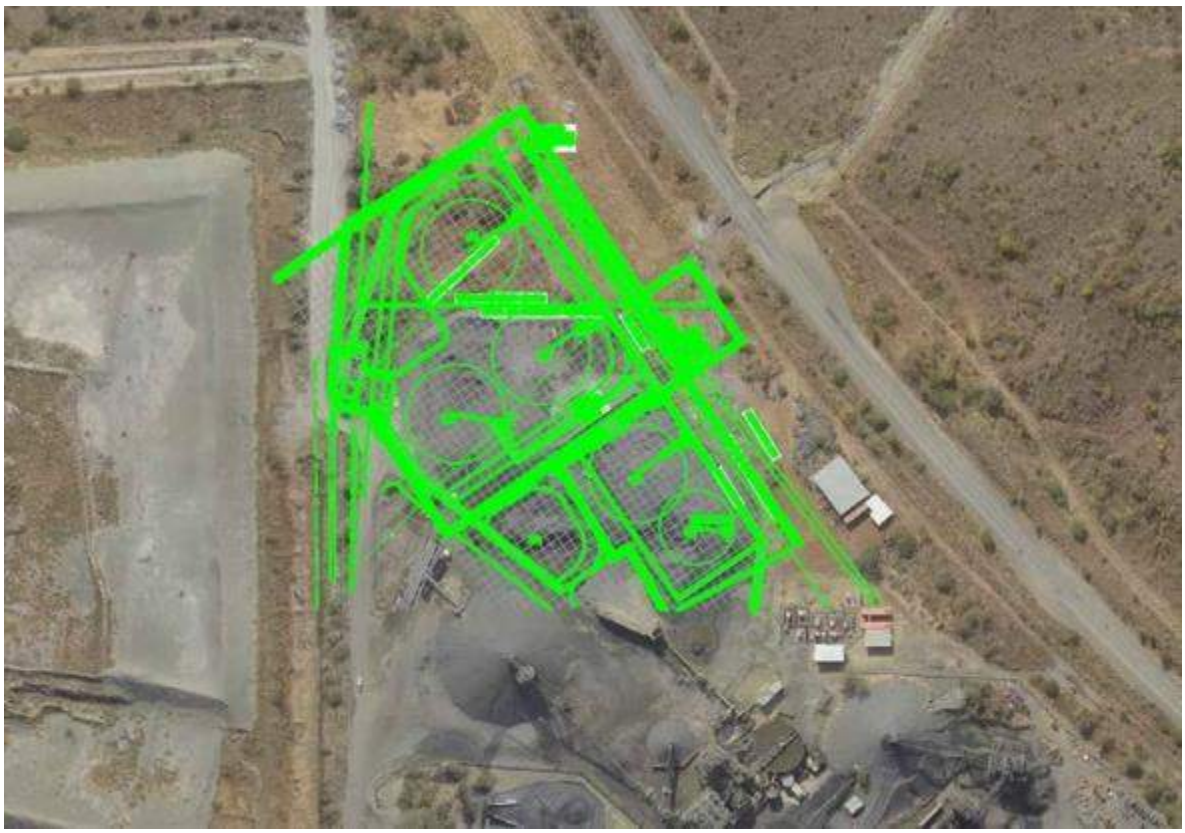


Figure 7: Layout of the Low-Grade Product Stockpile and Associated Infrastructure

Figure 8: Layout of the Low-Grade Product Stockpile and Associated Infrastructure in relation to the lower RWD

1.d.ii.2.b North Shaft Infrastructure (roads, offices and change houses)

The north shaft infrastructure will be an upgrade project, where the following will be undertaken (refer to Figure 9):

1. Existing temporary containers and security access will be removed, and the area rehabilitated;
2. New covered parking areas will be constructed for both visitors and employees. It is the intention of Dwarsrivier Mine to pave all walking, parking and road surfaces. However, for the parking area, discard rock from the Discard Storage Facility will initially be used depending on the mine obtaining exemption from Regulation 5 of Government Notice 704, 1999 (GN704) from the DWS;
3. Walkways will be constructed within the North Shaft infrastructure area. These will be paved and clearly demarcated;
4. A new change house will be constructed for the underground personnel of the North Shaft. This system will tie into the existing water management system located at the South Mine, or into the planned Water Treatment Works (WTW) which will be constructed at the plant in the near future (approved as per the 2018 Environmental Authorisation);
5. New, formally constructed offices will be constructed as brick buildings;
6. A two-way access road will be constructed, which ties in with the Sekhukhune Road. This road will have a width of a maximum of 8m. The road will also include a traffic circle to manage the flow of traffic in this area. The overall length of the surface of this road will be approximately 920m. The only clearance required in this area is for the traffic circle and possibly on the kerbs of the two-way road on the eastern side. An area of about 0.7ha clearance is foreseen. For the road construction, discard rock will initially be used depending on the mine obtaining exemption from Regulation 5 of Government Notice 704, 1999 (GN704) from the DWS, where after these roads will be paved;
7. A new Store and associated Office area will be constructed which will serve as the receiving bay for all equipment and material stored for the North Shaft activities. A one-direction road of approximately 6m wide will be constructed to enter the area and exit the area on the other side. Access with be from the northeastern corner of the stores, in a westerly direction with the exit located around the site on the southeastern corner, via the two-way road. The length of this road will be approximately 160m. This area will be fenced off and have strict access control;
8. The current laydown area will be formalised in dedicated areas for the North Mine activities. Bunded areas will be constructed for the storage of oils, filters, batteries, or any other material which may cause an impact on the environment. This area will be fenced off and have strict access control;

9. No additional changes will be undertaken at the North Workshop area as this area has been recently upgraded through concreting surfaces and roofing areas where chemicals are stored; and
10. Protected tree species that have been previously demarcated are present in this area. Measures will be required to relocate these species or alternatively implement the management measures as recommended by the ecologist.

Figure 9: Typical Layout of the North Shaft Infrastructure Area

1.d.ii.2.c Truck Parking Area

The mine has an existing truck parking facility which is located at the entrance to the South Mine Plant. This truck parking serves all receiving and exiting trucks. The mine currently receives on average 150 arriving trucks per day. These trucks enter the truck parking, where it is weighed at empty load. The necessary signage and requirements are then assessed and corrected where necessary, whereafter the trucks enter the plant area where chrome is uploaded. The trucks then return to the parking area, where it is again weighed at its full load and the tarpaulins are secured. Please refer to the following figure illustrating the sequence of activities taking place once trucks are received on site.

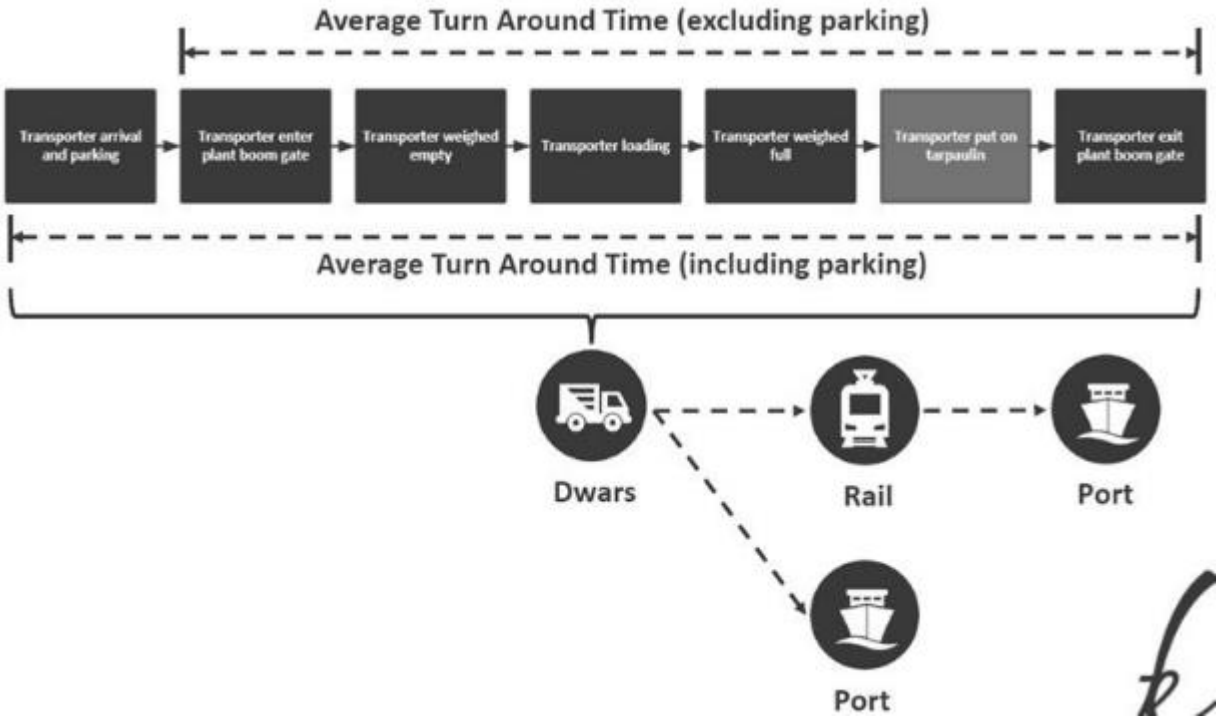


Figure 10: Schematic layout of the Truck Receiving and Existing Sequence

The fact that this parking area receives 150 arrivals per day and must accommodate the existing trucks is leading to a logistical bottleneck, with trucks forced to park on the regional road. Studies conducted on the mine have indicated that there is a 36% reduction in processing time on days when high volumes of trucks are processed. For this reason, an alternative parking area must be identified.

Three main options have been identified for the proposed parking area. With each of these options, the trucks will enter on the Two Rivers Mine Road and exit via the existing truck parking at the current mine entrance (see brown line for the approximate access roads on the following figure).

The Two Rivers Platinum Main Road will be designed in consultation with the relevant Roads Department (i.e. to adhere to road design parameters). Trucks will be travelling in one direction on a single-lane road, a traffic circle will be allowed for to ensure that trucks can exit this area if they do not meet safety requirements. For the road construction, discard rock will be used depending on the mine obtaining exemption from Regulation 5 of GN704 from the DWS, alternatively the roads will be scraped and maintained. The road will be located in such a manner not to cross the non-perennial drainage channel, running in an east to west direction between the old TSF and current Discard Storage Facility and draining into the Groot Dwarsrivier. This channel formed part of a non-perennial drainage line, which was diverted during the time of opencast operations (lawfully in terms of the approved WUL) in the early 2000s to allow for safe mining practices. The diversion took place at North Mine along the eastern boundary of the site (east of the current North RWD). The channel of this drainage line is still present, and water is conveyed towards the Groot Dwarsrivier during rainfall periods. Please see the blue line indicated on the figure hereafter. According to the hydrologist specialist studies, this channel has a flood line and is regarded as a watercourse for the purposes of the NWA (refer to Section 1.g.iv.1.g.3 on page 145).

For Option 1, the parking area is proposed to the north of the Old TSF. The non-perennial drainage channel discussed earlier, is present approximately 30m to the north of this location. The trucks will enter to the west of the parking, and then tie into the existing road (Road A) linking the plant and the Discard Storage Facility. Trucks will be loaded at the plant where after the trucks will exit to the existing truck parking.

For Option 2, the facility will be located to the west of the lower RWD, just east of the Two Rivers Platinum Mine Road. Trucks will enter this parking on the northern side, and will exit to the south, travelling on the existing road (Road C), linking the plant to the lower RWD. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A). An alternative to this, will be to utilise Road B (indicated in purple),

which is an existing road, traversing to the north of the Old TSF. From here the trucks will again tie up with the proposed Road A.

For Option 3, the facility will be located to the south of the lower RWD, just northwest of the upper RWD. The trucks will enter this parking areas from the same access road as proposed for the other two options and will enter from a westerly direction and exit on the eastern perimeter of the proposed site. Trucks will then turn towards the plant, just after the old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A).

In all three instances, trucks will be loaded at the plant, whereafter the trucks will exit to the existing truck parking.

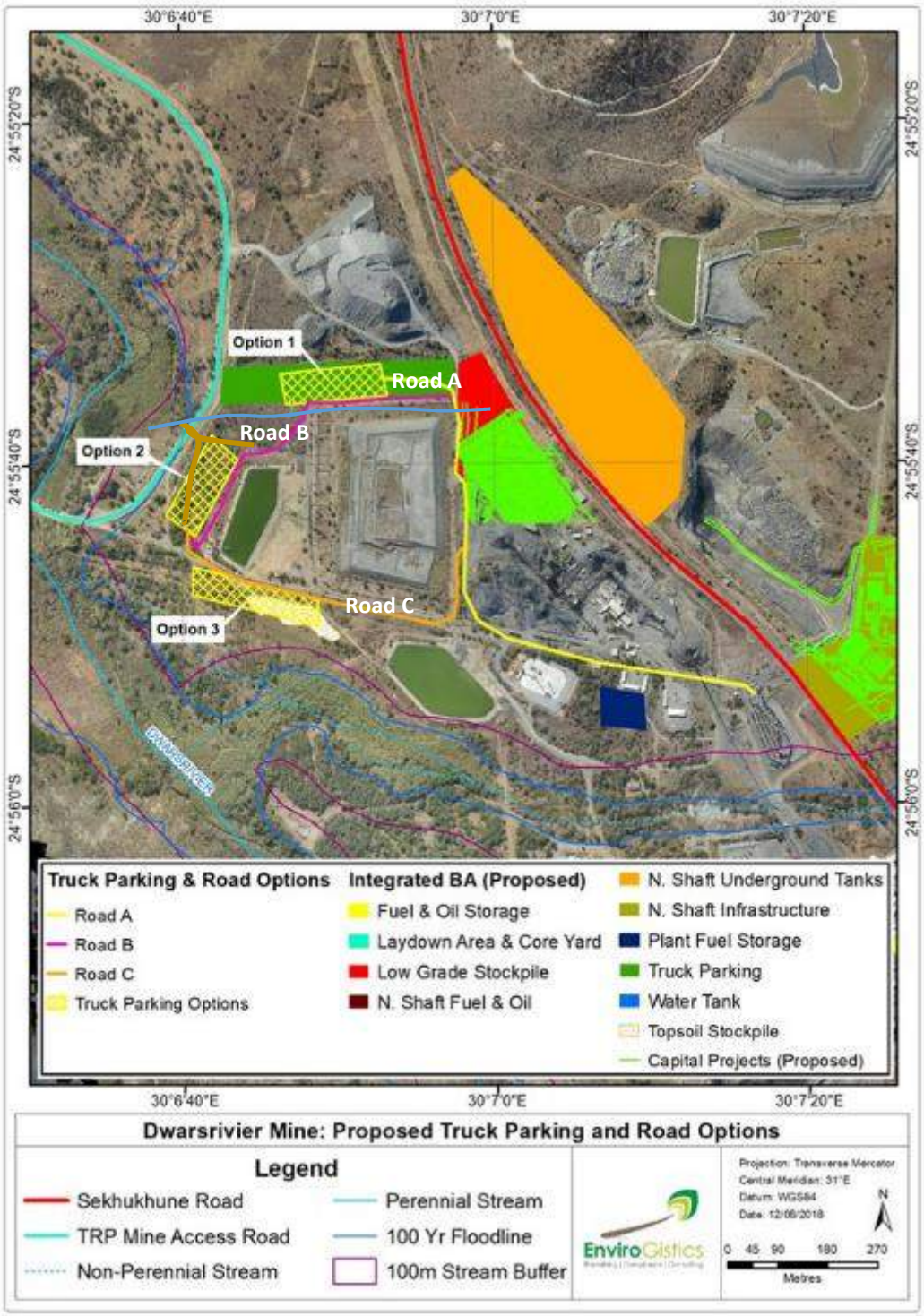


Figure 11: Location of the Truck Parking Area Options and Roads alternatives (illustrative purposes)

Based on the outcomes of the specialist studies, Option 1 is the preferred site and is being applied for. The site is located outside of flood lines, but will require GN704 exemption due to being located within 100m of a watercourse.

It is expected that the truck parking area will consist of an appropriate surface such as crushed rock, a fence to demarcate the area, a security building, lighting and other associated infrastructure. The roads will be cleared and compacted with discard rock should exemption in terms of GN704 for Regulation 5 be obtained. Other activities will include:

- A turnaround area as discussed, an internal road not wider than 4 m and only one way (from the turnaround area to the truck park);
- Chemical toilets or alternative for the drivers (men's and ladies') will be provided during the construction phase, whereafter septic tanks will be implemented;
- Safe walkways, as well as control rooms for the electronic signboards, induction, office and store rooms;
- High mast lights and boom gates;
- Automatic boom gates; and
- Weigh bridges will be positioned where trucks exit the yard into the plant area.

The local road located to the west of the truck parking area, and which serves as the access to the Two Rivers Platinum Mine, will be upgraded in consultation with the relevant roads agency. This will include:

- Road widening;
- New fences; and
- A Guard House at the entrance.

The following figures presents the detailed outline of the Truck Parking Area (Option 1):

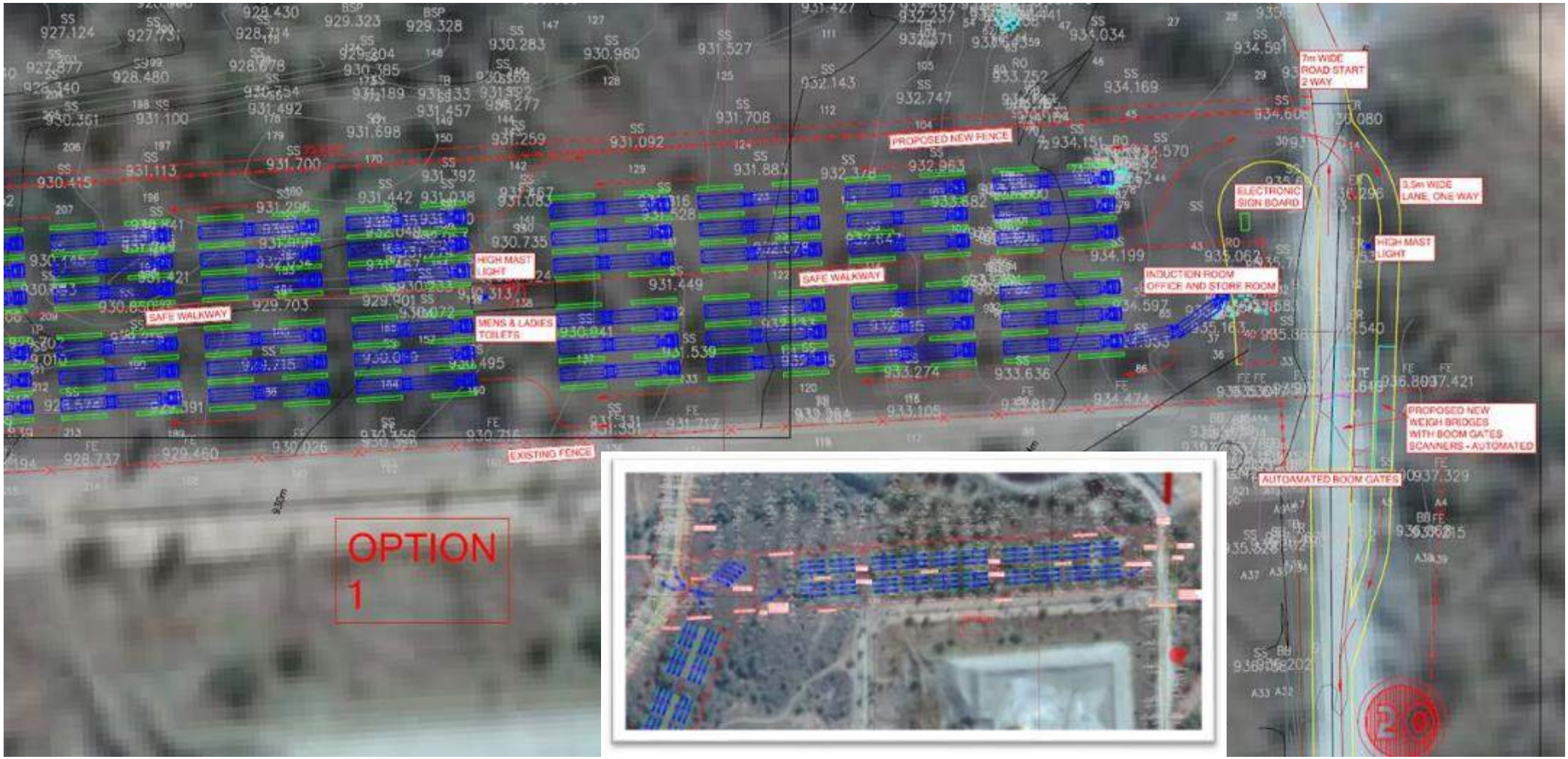


Figure 12: Eastern section of the Truck Parking (Option 1)

Figure 13: Western Section of the Truck k Parking (Option 1)

1.d.ii.2.d South Mine Laydown Area

The mine has a current Laydown Area on South Mine, next to the Salvage Yard. It is the intention of the mine to formalise this Laydown Area and therefore expansion of the existing laydown area footprint is required. This area will be used for the storage of various materials and equipment used in the mining operation. Specifically demarcated bunded areas will be present for the storage of material, such as oil filters and batteries, which could cause environmental pollution if not contained. The area will be fenced off with strict access control measures. A single two-direction access road will be constructed.

This area will also cater for the Core Shed, which will be used to store and assess all the cores collected from the exploration drilling activities. Refer to the figure hereafter.

Figure 14: Typical Layout of the Laydown Area

1.d.ii.2.e Treated Water Reservoir

A Water Treatment Plant (WTP) is currently being constructed to treat and release excess water, or treat and reuse dirty water from Dam 26 with the aim to reduce the volumes of clean water abstraction from alluvial boreholes in the future – this requirement arose from the water balance and water management study and does not form part of this application, but rather as a commitment that the mine must investigate the required design for the intended purpose of treating dirty water to be reused in the mining process. The WTP is a condition of the 2008 WUL. The WTP does not require a Waste Management Licence or Environmental Authorisation due to the size and capacity thereof not triggering any listed activities in terms of NEM:WA or NEMA. No waste for onsite storage or disposal is being produced by the facility.

The purpose of the WTP is to clean this water source to a quality equal to the SANS 241 standard. Currently it is foreseen that Dam 26 water will be purified through this system at about 200 – 430m^3 per day to the SANS 241 standard.

The water treatment process consists of three (3) main steps, namely anoxic biological nitrate removal, lime softening and ultra-filtration. The first step is performed by a fixed bed bioreactor in a separate tank, while the latter steps take place inside the water treatment container:

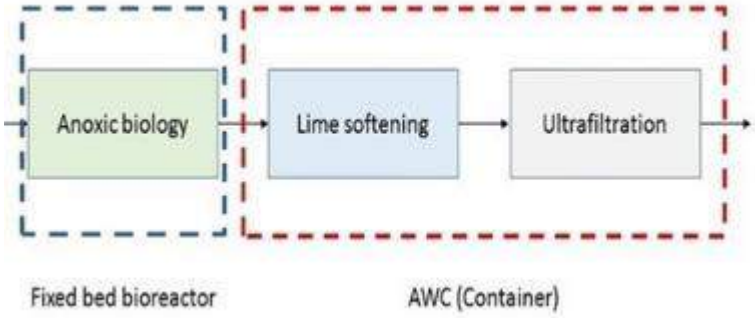


Diagram 1: Water Treatment Works Process Diagram

The process involves anoxic biological pre-treatment and then follows through the compartments of the container in the sequence in which the water passes through. The description of each step will include the operational equipment requirements and a list of necessary service operations that needs to be carried out on a regular basis.

The process is displayed in the flow chart hereafter. It indicates the equipment within the container (highlighted within the red dotted line) and the peripheral equipment that will be placed outside the container.

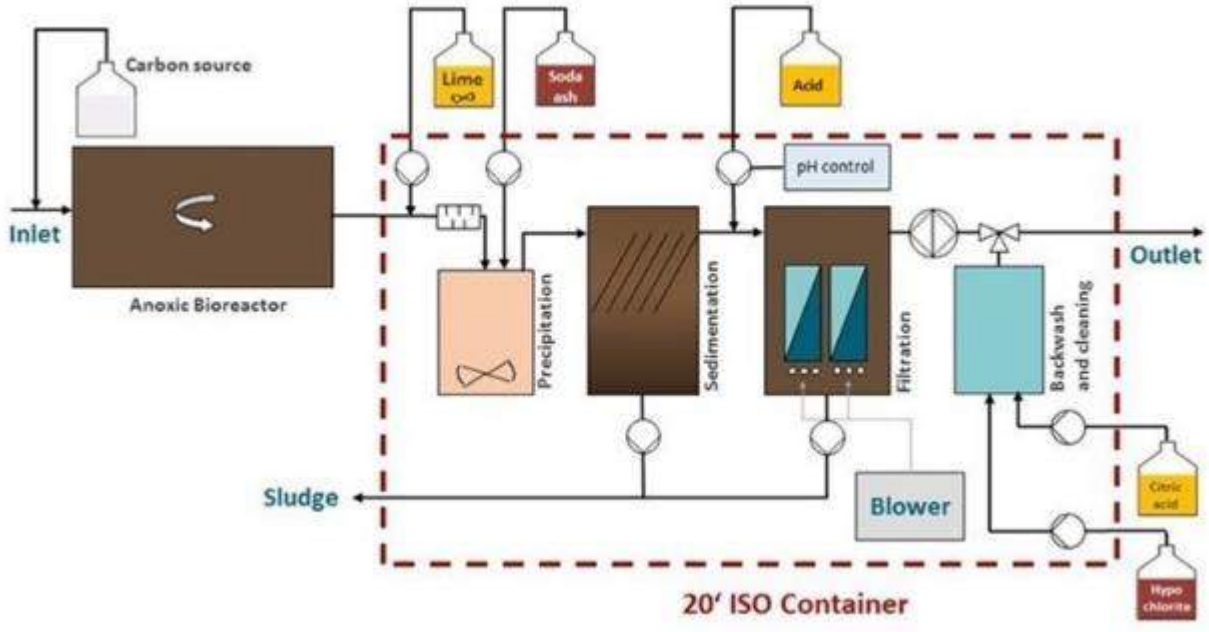


Diagram 2: Water Treatment Works Process Flow Diagram

The water from the cleaning procedures is stored in the backwash and cleaning tank, which has a volume of 2m^3 and is located beside the filtration tank. The quality of the water planned to be supplied to the Plant (process water) is presented in the following table.

Table 11: Water Treatment Plant Quality Results

Variable	Typical (mean)	Range			WTP Results
		Minimum	Median	Maximum	Feed
Total Dissolved Solids (TDS)	**899,76**	696,00	898,00	1280,00	593,000
Suspended Solids	**74,74**	3,60	79,60	222,00	11,800
Nitrate & Nitrite as N	**59,22**	0,10	55,35	138,00	41,896
Chloride (Cl)	**66,25**	30,00	55,50	138,00	103,000
Total Alkalinity ($CaC0_3$)	**339,98**	253,00	335,00	514,00	
Fluoride (F)	**0,31**	0,20	0,31	0,69	0,085
Sulphates ($S0_4$)	**74,37**	50,70	72,60	128,00	78,800

Variable	Typical (mean)	Range			WTP Results
		Minimum	Median	Maximum	Feed
Total Hardness ($CaCO_3$)	**519,00**	519,00	519,00	519,00	558,820
Calcium Hardness ($CaCO_3$)	**70,00**	70,00	70,00	70,00	147,170
Magnesium Hardness ($CaCO_3$)	**449,00**	449,00	449,00	449,00	411,750
Calcium (Ca)	**56,78**	28,10	56,70	96,10	58,900
Magnesium (Mg)	**102,80**	78,70	100,00	137,00	**100,000**
Sodium (Na)	**58,92**	32,60	55,70	89,00	70,600
Potassium (K)	**9,99**	6,74	9,75	18,40	9,780
Conductivity	**124,54**	78,90	122,00	184,00	1,320
pH	**8,44**	7,05	8,58	9,54	8,640
Total Inorganic Nitrogen as N	**64,48**	3,82	56,90	208,00	
Nitrate ($N0_3$)	**227,14**	0,44	210,00	572,00	**155,000**
Hexavalent Chromium Cr6+	**0,01**	0,01	0,01	0,01	
Ammonia as NH_3	**0,53**	0,20	0,53	1,12	
Chemical oxygen demand	**80,35**	34,00	67,00	155,00	43,500
Free & Saline Ammonia NH_3 as N	**3,23**	0,20	2,65	26,10	
Iron (Fe)	**0,05**	0,01	0,02	0,21	0,010
Manganese (Mn)	**1,92**	0,01	0,02	93,00	0,005
Aluminium (AI)	**0,03**	0,01	0,01	0,14	
Cadmium as Cd	**0,00**	0,00	0,00	0,01	0,000
Lead as Pb	**0,01**	0,01	0,01	0,01	0,001
Zinc as Zn	**0,02**	0,01	0,02	0,04	0,010
Total Chromium as Cr	**0,06**	0,01	0,03	0,22	0,007
Vanadium as V	**0,03**	0,01	0,03	0,11	0,011
Cobalt as Co	**0,01**	0,01	0,01	0,02	
Copper as Cu	**0,01**	0,01	0,01	0,03	
Ortho Phosphate as P	**0,67**	0,20	0,67	1,19	0,326

While the backwash procedure is performed on a fully automated basis, the chemical cleaning is semi-automatic and requires the intervention of a service operator. The service operator needs to connect two canisters with cleaning chemicals (sodium hypochlorite and citric acid) to two dosing pumps that are connected to the backwash and cleaning tank.

Solids that are held back at the membranes will be removed from the modules during backwash and cleaning and settle at the bottom of the filtration tank. To avoid their accumulation, the filtration tank is also equipped with a sludge removal pump.

The treated water is then discharged through the outlet to the proposed Treated (Clean) Water Reservoir, located just north of Dam 26, to the northeastern corner of the WTP. The quality of the water stored in the proposed Reservoir will conform to the SANS 241 Drinking Water Standards and will be used for potable water supply and where clean water is specifically required in the mining process.

The overall facility is located in an old contractor's yard, and therefore no vegetation clearance is required (Figure 15).

Figure 15: Location of the Treated Water Reservoir (circular structure) in relation to the WTP (black square)

This reservoir will be a circular steel tank at a capacity of 900m^3 (Figure 16).

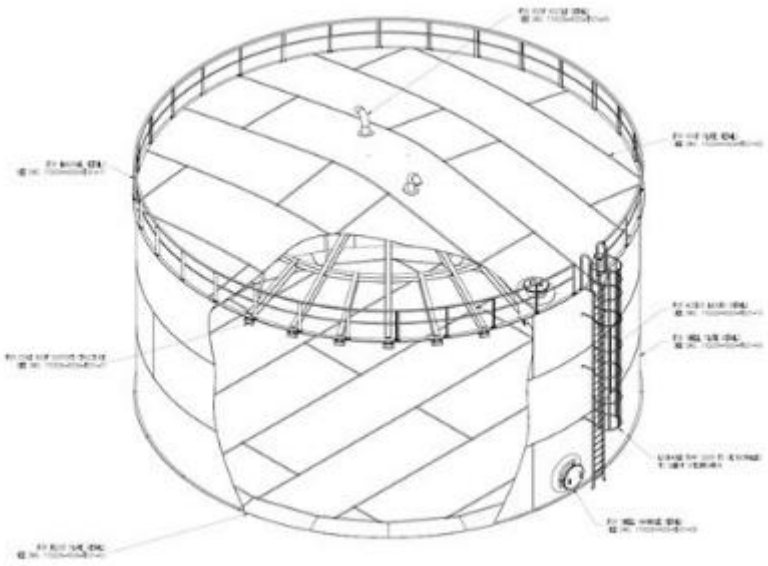


Figure 16: Typical Layout of the Reservoir (illustration purposes only)

1.d.ii.2.f Security Office Upgrades

The existing entrance at the main offices currently comprises of a security access point and visitors parking. It is the intention of the mine to formalise this area into a formal security access area (brick building) and a more logistical layout for the parking to accommodate additional parking spaces. No additional clearance will be required for this purpose, however, an additional roadway will be required. This road will allow for a traffic circle to regulate traffic and will be about 8m in width with a maximum length of 250m, including the traffic circle. No clearance will be required for this activity as it will be located in the existing area. Refer to the figure below.

Figure 17: Security Office Upgrades

1.d.ii.2.g Topsoil Stockpile Expansion

According to the topsoil balance undertaken by GCS (Pty) Ltd during 2016, the volume of topsoil required for future rehabilitation is indicated to be 110,309.1m^3 with this volume being more than the available topsoil volume which stands at 104,651.6m^3. The clearance activities on site will allow for the maximum removal of topsoil from the proposed sites but will also necessitate additional areas for the stockpiling of such topsoil for rehabilitation purposes. For this reason, it is recommended that Topsoil Stockpile #3 [naming in terms of the Topsoil Management Plan (GCS, 2016)] be expanded as indicated in the following photo and Figure 3.

The height recommended in the 2016 Topsoil Management Plan has a range of 2-4m. The current topsoil stockpile currently has a footprint of 0.43ha. This topsoil stockpile will be expanded by approximately 0.6ha and will have a final footprint of approximately 1ha at a maximum height of 4m.

According to the 2016 Topsoil Management Plan, a storm water drainage channel should be constructed upslope of Topsoil Stockpile #3 to divert stormflow or runoff away from the stockpile in order to reduce the chances of soil erosion from the stockpile. The drainage channel should have a minimum side slope of 1:2 and a depth of not more than 1m. This latter management measure will form part of this project.

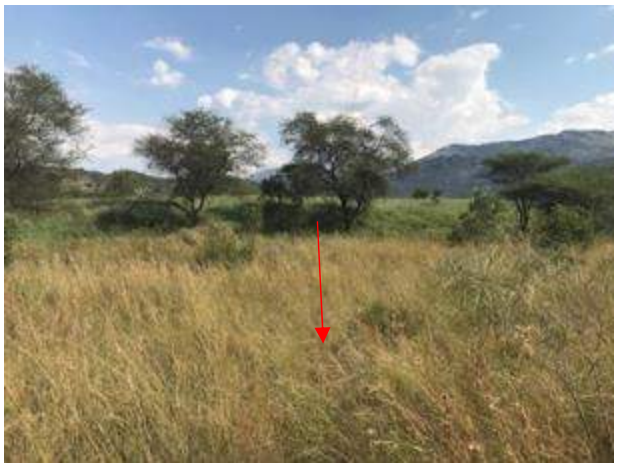


Photo 2: Topsoil Stockpile #3 (arrow indicating area of extension)

1.d.ii.2.h North Mine Fuel and Diesel supply to Underground

Similar to the Bulk Fuel Storage Area at South Mine (Photo 5), the North Mine requires a dedicated area to supply fuel and oils to the underground workshop. This area will comprise of two (2) 23m^3 tanks, one for hydraulic oils and one for diesel. The area anticipated is located to the southwest of the North RWD. Please refer to the photo below of the area proposed:

Photo 3: Area earmarked for the installation of the tanks

Access to this area will be via existing roads accessing the North TSF as shown below:

Photo 4: Access Road to Underground Fuel Supply area

The tanks will be serviced and operated by Total (the planned new fuel supplier of the mine).

The two tanks will be placed on concrete bunded systems, with a sump to capture any potential spills which may occur. Around the bunded area will be a smaller bunded area, in which the fuel filling pipes are located. Please refer to the following photo, illustrating the South Bulk Fuel Storage Area (which is typically what the North Supply area would also consist of, only in smaller volumes):

Photo 5: South Mine Bulk Supply Area

Small diameter steel pipes will supply fuels to the underground workshops, though a cemented tunnel. Flow meters will be present on the pipes to determine the volumes of fuel supplied, as well as monitor whether there are any leakages in the system. The flow meters will be linked to the mine's internal Skada record keeping system. Please refer to the following two photos for the illustration of these designs:

Photo 6: Supply pipes and flow meters

1.d.ii.3 Project 3: Fuel and Oil Storage

Dwarsrivier Mine is planning on appointing a new fuel supplier, Total. Due to transfer in service providers, the new supplier will be conducting studies on the current status of the existing tanks and in this process will remove the existing facilities and replace these with Total-type facilities. The removal (therefore decommissioning) of the existing facilities will specifically take place at the current South Mine TMM Workshop, as well as at the South Mine Bulk Fuel Supply System (the latter supplies fuel to the underground workings). In addition to this, the mine will be erecting two new facilities, one at the North Mine, within an existing cemented and bunded area, and one at the future Workshop Area at the plant (the clearance of this area has been approved in the 2018 Environmental Authorisation - Refer to Section 1.a.iv).

Figure 18: Fuel Storage Areas

It is currently planned that the mine will store a total volume of 340m^3 of fuel/ oils on site (excluding the underground fuel supply of North Mine - with this included the total storage capacity will be 386m^3). It is planned that fuel and oil storage will take place at 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; and
- Farm Dwarsrivier 372KT Portion 1: Plant Workshop.

Please refer to the following table for more detail and to Figure 18 for the locations of fuel storage areas.

Table 12: Fuel/Oil Storage

South Mine TMM Workshop/Main stores (decommissioning and new)

Product	**Current Tank Capacity**	**New Tank Capacity**
Diesel	1 X 23m^3	1 x 65m^3
Oils	2 x 14m^3	2 x 30m^3
	51m^3 total	125m^3 total

South Mine Bulk Supply (decommissioning and new)

Product	**Current Tank Capacity**	**New Tank Capacity**
Diesel	1 X 23m^3	1 x 65m^3
Oils	2 x 14m^3	2 x 30m^3
	51m^3 total	125m^3 total

North Shaft (new supply)

Product	**New Tank Capacity**

Diesel	1 x 23m³
Oils	2 x 11 m³
	45m³ total

Plant (new supply)

Product	**New Tank Capacity**
Diesel	Combined 45m³
Oils	

North Mine Underground Fuel Supply

Product	**New Tank Capacity**
Diesel	23m³
Oils	23m³

The following table presents the applicable listed activities associated with the diesel and oil storage. For consistency and to keep all these areas grouped, the north bulk storage area is also included here again (highlighted in green).

Table 13: Project 3: Diesel/Oil Storage

Description	Footprint Size	Capacity	Coordinates	Listed Activities triggered
North Shaft Fuel and Oil Storage	523m²	New Tanks: 45m³	24°55'45.33"S 30°7'25.62"E	**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.
South Mine Bulk Fuel and Oil Storage	845m²	Decommissioned Tanks: 51m³ New Tanks: 125m³	24°56'23.18"S 30°7'11.20"E	**Listing 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. **Listing 1, Activity 31:** The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice.
South Mine Main Stores Fuel and Oil Storage	Within existing TMM Workshop area (185m²)	Decommissioned Tanks: 51m³ New Tanks: 125m³	24°56'8.83"S 30°7'26.34"E	
Plant Fuel Storage	North of the North Mine Laydown Area	New Tanks: 45m³	24°55'54.53"S 30°7'8.84"E	**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.
North Underground Fuel Supply	Supply area: 9.8ha (a maximum area of 0.05ha clearance will be required – 500m²).	2x 23m3 tanks in diesel bunded area, with steel pipes supplying underground workshops through a cemented tunnel.	24°55'25.83"S 30°7'1.93"E	**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. **Listing 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 1, Activity 27:** *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— except for the undertaking of a linear activity (this listed activity is kept as final layouts are not yet available).*

Note: Highlighted area (in green) is disused under Capital Projects, but included in this summary table to bring all similar activities together.

1.d.ii.4 Project 4: Water Discharge

This project has been excluded from the current Environmental Authorisation Process. Further hydrological and aquatic studies are required to determine the impact of the discharge into the Dwarsrivier system.

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)
  - Drafting of contracts and protocols
- Construction Phase:
  - Land and footprint clearance
  - Topsoil stripping and stockpiling
  - Establishment of surface infrastructure
  - Waste Management
- Operational Phase:
  - Operation of Metallurgical Low-Grade Product Stockpile
  - Operation and use of Diesel Storage and Supply
  - Implementation of Drilling Programme and concurrent rehabilitation
  - Transportation (load-out area, roads)
  - Operation of infrastructure and roads
  - Waste management
- Closure Phase:
  - Ensure the implementation of Legal Requirements (Environmental Permits)
  - Rehabilitation of Drilling Sites
  - Dismantling and decommissioning of infrastructure and buildings, including product stockpiles
  - Earth moving, shaping and ripping of ground
  - 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 14: 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 have 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.
Specific Environmental Management Acts (SEMAs)		
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 the South African Heritage Resources Association (SAHRA). *A heritage permit will be required as a new road exceeding 300m in length will be constructed. In addition, more than 5 00m^2 of land will be cleared for the new mining operations, including the re-use of historic mines.* A heritage assessment and paleontological have been undertaken to comply with Regulation 38 of the NHRA. The SAHRA forms part of the Interested and Affected Parties (I&APs). The draft Scoping Report was made available to the Agency and comments were received. The draft EIA includes the specialist studies and will be made available to the Agency again 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-*** ***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;

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
		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. The Dwarsrivier Mine's existing Water Use License (WUL) is currently being updated and the changes in the approved facilities will be incorporated into this process. According to Regulation 4 of Government Notice 704 (hereafter GN704), promulgated in terms the NWA, no person in control of a mine or activity may – (a) Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked; and (b) Carry on any underground or opencast mining, prospecting or any other operation or activity under or within the 1:50 year flood line or within a horizontal distance of 100 m from any watercourse or estuary, whichever is the greatest. Exemption from the above requirements may be applied for, in terms of Regulation 3 of GN704. Regulation 5 exemption will be required for the use of discard rock in the construction activities i.e. roads and parking areas. Regulation 6 and 7 of Government Notice 704 (hereafter GN704), promulgated in terms the National Water Act (Act No. 36 of 1998) (hereafter NWA), are relevant for the SWMP. These Regulations can briefly be summarised as follows: • Confine or divert any unpolluted water to a clean water system, away from a dirty area; • Runoff from dirty areas must be captured and contained; • Clean and dirty water systems must be designed and constructed to prevent cross contamination; • Dirty water must, as far as possible, be recycled and reused; • Clean and dirty water systems must convey/contain the 50 year storm event, and should not lie within the 100 year flood line or within a horizontal distance of 100 m from any watercourse, whichever is the greater of the two; and • Appropriate maintenance and management of storm water related infrastructure should be ensured at all times.
National Legislation		
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	This report	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);

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
		• 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. 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. The EIA Application fee of R10 000 was paid to the DMR on 19 April 2018. An Application for Environmental Authorisation was couriered to the DMR and received by the DMR on 12 April 2018. The DMR acknowledged the application on 24 April 2018. (Refer to Annexure 1). The Scoping Report was acknowledged by the Department on 26 June 2018. *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 principle 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 DMR and the Department of Environmental Affairs (DEA). 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 the Dwarsrivier Mine. No changes to the Mining Works Programme is 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) (NEM:WA)	The NEM:WA waste activities are not being triggered as part of this project. However, this legislation is considered in the development of waste management measures and assessing potential impacts.	The NEM:WA 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 NEM:WA 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 NEM:WA 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 NEM:WA stipulates that the Act should be interpreted and guided in accordance with these sustainability principles. The NEM:WA, 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;***

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
		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."***
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)	Relevant to protected floral species removals, as well as to development within the Critical Biodiversity Area (CBA) and threatened ecosystem areas.	The NEM:BA 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 Licence to authorise actions and activities affecting the 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. Four floral SCC, namely *Sclerocarya birrea subsp. caffra, Lydenburgia cassinoides* which are protected under the National Forest Act (Act 84 of 1998), Aloe castanea and Aloe marlothii protected under Limpopo Environmental Management Act (LEMA) (Act 7 of 2003) were the only floral SCC observed within the Sekhukhune Mountain Bushveld Habitat Unit during the field assessment. Protected trees occur throughout the MRA and focus area (Drilling pads) in moderate/ high numbers and before construction before any construction or drilling activities can occur a detailed walk down of the area must take place to mark all protected tree species. Permits from the Limpopo Department of Economic Development and Tourism (LEDET) and Department of Agriculture, Forestry and Fisheries (DAFF) should be obtained to remove, cut or destroy these tree species before any proposed mining activities may take place. Vitex obovata subsp. wilmsii was observed within the habitat unit and it is considered an important food resource for Pycna sylvia (Cicada). According to the Fetakgomo-Greater 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. Appendix 6 presents the detailed outcomes of the specialist study.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	Financial Provision	Section 41 (1) of the MPRDA has been repealed and in terms of Section 24P in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as amended, which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. Section 24P of the NEMA, as amended, provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the following: - Rehabilitation of the adverse environmental impacts of the listed or specified activities; - Rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water; - Decommissioning and closure of the operations; - Remediation of latent or residual environmental impacts which become known in the future; - Removal of building structures and other objects; and/or - Remediation of any other negative environmental impacts.

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
		In addition to Section 24P, the Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on the 20 November 2015 (Government Notice No. 1147 published in GG 39425) (GN R1147). For the purposes of this EIAr, the financial provision estimate and respective reports are in line with the requirements of the Financial Provision Regulations. Regulation 11 of GN R1147requires a holder of a mining right to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for: • Annual rehabilitation as reflected in the Annual Rehabilitation Plan (ARP) as per the minimum content prescribed by Appendix 3 of GN R1147; • Final rehabilitation, decommissioning and closure as reflected in the RCP as per the minimum content prescribed by Appendix 4 of GN R1147; and • The remediation of latent or residual environmental impacts including but not limited to the pumping and treatment of polluted or extraneous water, as reflected in an Environmental Risk Report (ERR), as per the requirements of Appendix 5 of GN R1147.
Municipal Plans		
Integrated Development Plan (IDP) (Final (DP/Budget 2016/2017-2018/2021 Consolidated IDP for Fetakgomo Greater Tubatse Municipality – adopted 27 October 2016))	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-Greater 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 makes 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 • Baleshaba community (3/03/1998) – Gazetted/ Further Research The office of the [Regional Land Claims Commissioner] RLCC: Limpopo were also informed of this project.

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
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: Resource and Reserve Drilling

Regulation 23 of the MPRDA states in Section 1(a), that subject to subsection (4), the Minister must grant a mining right if the mineral can be mined optimally in accordance with the mining work programme. The mine has been awarded a Mining Right by the DMR and therefore has an obligation to give effect to the following:

- The ongoing development and improvement of the Mining Work Programme which details the planned mining activities to be followed in order to mine the mineral resource optimally; and
- Optimal mining of minerals must be undertaken, as the Minerals and Petroleum Board may recommend to the Minister to direct the holder of a mining right to take corrective measures if the Board establishes that the minerals are not being mined optimally in accordance with the Mining Work Programme. The Minister may, on the recommendation of the Board, suspend or cancel a mining right if the Minister is convinced that any act or omission by the holder justifies the suspension or cancellation of the right.

Dwarsrivier Mine conducts an annual exploration project, which mostly comprise of drilling, sampling, assay analysis, modelling and reporting of Mineral Resources and Reserve. For this purpose, Dwarsrivier Mine is planning on expanding the exploration programme at the mine to assess the available reserves within their Mining Right Area. The objective of the exploration project is to improve the confidence level/ quality of the data that has been collected from previous exploration phases via drilling, sampling and assay analysis. This area is planned over Portion 0, 1, 6 and 7 of the farm Dwarsrivier 372KT over which the mine holds mining rights. The activity will involve:

- construction of temporary access roads (approximately 6m wide); and
- construction of 'drilling pads' (20m x 20m) and related temporary infrastructure.

Based on the results from the exploration studies, the inferred resources may be re-classified into indicated/ measured resources. Another important outcome of the drilling programme will be to verify the presence of anomalous geological conditions interpreted from studies conducted throughout the farm Dwarsrivier 372KT. The ore body model, as well as the production plans of the mine will be updated based on the exploration project, year on year. This will feed into the annual update of the Mining Works Programme. The Mining schedule will be compiled using the ore body model updated from the information sourced from the exploration activities.

The reserve statement issued as part of the final product annual will give an indication of the expected feed grade to the plant.

1.f.ii Project 2: Capital Projects

Various capital projects are being planned on site, which include:

- Low-Grade Product Stockpile Development
  - The current stockpile footprints of both the low-grade and high-grade material are not sufficient to accommodate additional stockpile requirements. During 2017 there was insufficient capacity at the ports to store product, which in turn resulted in a chain reaction on site. The need for the extension of the stockpile capacity at the plant is of critical importance to ensure flexibility in supply of chrome at the mine. The design of the facility must allow for the storage of three (3) months' production capacity based on a total of 1.7 million tons product produced per annum.
- North Shaft Infrastructure
  - The activities proposed at the North Mine relates to the formalisation of existing infrastructure and the improvement of the internal access and transport logistics.
- Truck Parking
  - The existing Truck Parking area receives 150 arrivals and must accommodate the trucks arriving and exiting the site. The existing layout is leading to a logistical bottleneck, forcing trucks to park on the regional road. Studies conducted on the mine have further indicated that there is a 36% reduction in processing time on days when high volumes of trucks are processed. For this reason, an alternative parking area must be identified, which could cater for arriving trucks. The existing facility will then accommodate the trucks prior to existing the facility.
- South Mine Laydown Area
  - The activities proposed at the at the South Mine laydown area are to formalise the existing area and to allow for additional storage capacity to ensure this formalisation. The facility will also house the core yard, which is required to accommodate the storage and testing of core samples obtained from the exploration activities.
- Treated Water Reservoir
  - A reservoir to store water from the existing WTP are required to optimise water flow within the mining area. Water is currently diverted into the RWDs. In the past the mine has experienced overflows of dirty water from the RWDs. The WTP was constructed to treat dirty water within the internal mining circuit and thereby reducing the volumes required for water supply via boreholes. The requirements to store treated water is therefore an important component to ensure water conservation and the management of water demand.
- Security Office Upgrades
  - The activities proposed at the Main Office security upgrades relate to the formalisation of existing infrastructure and the improvement of the internal access and transport logistics.
- Topsoil Stockpile Expansion
  - The clearance activities on site will allow for the maximum removal of topsoil from the proposed sites, but will also necessitate additional areas for the stockpiling of such topsoil for rehabilitation purposes.
- North Mine Fuel and Diesel Supply
  - Similarly to the South Mine, there is a need for an ongoing supply of diesels and oils to the North Mine Underground Operations. For this reason, a formal system is proposed which will ensure ongoing availability of supply.

1.f.iii Project 3: Fuel and Oil Storage

As explained in the project description, the mine is planning on appointing a new fuel supplier, Total. Due to transfer in service providers, the new supplier will be conducting studies on the current status of the existing tanks and in this process will remove the existing facilities and replace these with Total-type facilities. The mine will make use of this opportunity to optimise diesel and oil storage on site to ensure a sustainable supply to the mining operations.

1.f.iv Project 4: Water Discharge

This project has been excluded from the current Environmental Authorisation Process. Further hydrological and aquatic studies are required to determine the impact of the discharge onto the Dwarsrivier system.

1.g Motivation for the preferred development footprint within the approved side including a full description of the process followed to reach the proposed development footprint within the approved site

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

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

1.g.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 Right Area (note that Dwarsrivier and Two Rivers Platinum Mine shares the same Mining Rights area, but on different seams).

1.g.i.1.a.1 Project 1: Resource and Reserve Drilling

The location of the resource and reserve drilling programme is directly linked to the approved Mining Right Area. The demarcation of the drilling sites is as per a specific drilling plan with an exploration site located every 150m.

Various considerations were taken into account in determining the final location of the exploration drilling sites:

- Sites are subject to the rules and requirements of surface right owners, which in this case will include Two Rivers Platinum Mine. The area where Dwarsrivier Mine will deviate from the drilling layout previously considered during the Scoping Phase, will be around infrastructure such as the Two Rivers TSF and Two Rivers Plant areas. Drilling will however still be located within the same property and approximate location.
- 1:100 year flood lines (see Section 1.g.iv.1.g.4);
- Location of heritage buffers;
- Consideration of the ecological and soil buffers (see Section 1.k.ii);
- 100m buffer around the Richmond Dam; and
- 32m buffer around riparian zones.

Based on the above, the initial drill plan indicated 369 exploration holes, with the consideration of the specialist studies the drill plan has been amended to 323 exploration holes (located outside of the 1:100 year floodline and 32m buffer around the riparian zones and heritage exclusions as requested by the specialists).

1.g.i.1.a.2 Project 2: Capital Projects

Various Capital Projects are being planned on site, which are considered to be upgrades, expansions and/ or the formalisation of existing infrastructure. For this reason no alternative locations are associated with these projects. Some of the activities for which no site alternatives are considered, as these are upgrades or expansions to existing facilities area, include:

- Low-Grade Product Stockpile Development (placed within the vicinity of the current project stockpile area);
- North Shaft Infrastructure (upgrade and formalisation of existing area);
- South Mine Laydown Area (upgrade, formalisation and expansion of existing area);
- Treated Water Reservoir (placed in the WTP fenced area);
- Security Office Upgrades (upgrade and formalisation of existing area);
- Topsoil Stockpile Expansion (expansion of an existing Topsoil Stockpile); and
- North Mine Fuel and Diesel Supply (placed in proximity to the area where the underground North Mine workshop is located).

The only project where an alternative assessment will be required is the Truck Parking Area. To assist the reviewer/ reader of this report the section presented in the Project Description is repeated hereafter.

Three main options have been identified for the proposed new truck parking area. With each of these options, the trucks will enter on the Two Rivers Mine Road and exit via the existing truck parking at the current mine entrance.

The Two Rivers Main Road will be designed in consultation with the relevant Roads Department (i.e. to adhere to road design parameters). Trucks will be travelling in one direction on a single-lane road and a traffic circle will be allowed for to ensure that trucks can exit this area if they do not meet safety requirements. For the road construction, discard rock will be used depending on the mine obtaining exemption from Regulation 5 of Government Notice 704, 1999 (GN704) from the DWS; alternatively, the roads will be scraped and maintained. The road will be located in such a manner not to cross the non-perennial drainage channel, running in an east to west direction (between the old TSF and current Discard Storage Facility) and draining into the Groot Dwarsrivier. This channel formed part of a non-perennial drainage line, which was diverted during the time of opencast operations (lawfully in terms of the approved Water Use Licence (WUL)) in the early 2000s to allow for safe mining practices. The diversion took place at North Mine along the eastern boundary of the site (east of the now North Return Water Dam (RWD)). The channel of this drainage line is still present, and water is conveyed towards the Groot Dwarsrivier during rainfall periods. According to the hydrologist specialist studies, this channel has a flood line and is regarded as a watercourse for the purposes of the National Water Act, 1998 (NWA) (refer to Section 1.g.iv.1.g.3 on page 145).

For Option 1, the parking area is proposed to the north of the Old TSF. The non-perennial drainage channel discussed above, is present approximately 30m to the north of this location. The trucks will enter to the west of the parking, and then tie into the existing road linking the plant and the Discard Storage Facility. Trucks will be loaded at the plant whereafter the trucks will exit to the existing truck parking.

For Option 2, the facility will be located to the west of the lower RWD, just east of the Two Rivers Mine Road. Trucks will enter this parking on the northern side, and will exit to the south, travelling on the existing road (Road C), linking the plant to the lower RWD. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A). An alternative to this, will be to utilise Road B, which is an existing road, traversing to the north of the Old TSF. From here the trucks will again tie up with the Road A.

For Option 3, the facility will be located to the south of the lower RWD, just northwest of the upper RWD. The trucks will enter this parking areas from the same access road as proposed for the other two options and will enter from a westerly direction and exit on the eastern perimeter of the proposed site. Trucks will then turn towards the plant, just after the Old TSF where the trucks will be loaded. A turning point will be required at this area, from where the trucks will follow the same road as for Option 1 (Road A).

In all three instances, trucks will be loaded at the plant, whereafter the trucks will exit to the existing truck parking.

<u>Option 1- Preferred (preferred option)</u>

This option is located between two existing mining activities, provides no faunal habitat linkage and is not likely to be important for faunal species movement. The shallow soils and rocky nature as well as the close proximity to the ongoing mining and related activities, disqualifies this option for cultivation, grazing and wildlife activities. A number of *Lydenburgia cassinoides* (Sekhukhune Bushman's-tea) are located to the east of the parking area, predominantly along the diverted drainage line. These will need permit applications should removal/ destruction be necessary. A small number of *Vitex obovata* trees were observed within the eastern extent of the parking area and towards the stockpile, which are considered important food resources for the Cicada species *Pycna silva*, however there is a low probability that this area will be used by this species. According to the ecological specialists (SAS) (see Annexure 6), the diverted drainage line traversing this area is no longer considered a naturally functioning watercourse from an ecological perspective. This truck parking option falls outside of the flood lines, but within the 100m buffer of the drainage line. It is therefore unlikely that the proposed truck parking will disturb the drainage line or be at risk of flooding. The elevated area (approximately 1.5m to 3m elevation difference) on which the truck parking is proposed, should be kept in place, as it provides important elevation for the left bank of the drainage line. Due to the truck parking facility being located within the 100m buffer of the drainage line, it is likely that a GN704 exemption from Regulation 4(a) and (b) will be required.

<u>Option 2 – Less Preferred</u>

The faunal and floral habitat with this area has been degraded by the surrounding mining activities, however not severely. No floral or faunal Species of Conservation Concern (SCC) were observed or are expected to occur within this area. The parking area is not located within any flood lines or freshwater systems boundaries,

however it is located closer to the 100 year flood line than that of Option 3. Although truck parking Option 2 falls outside of the flood lines, it is located within the 100m buffer of the Dwarsrivier. It is therefore likely that the proposed truck parking will disturb the drainage line or be at risk of flooding. It is also located upgradient of the Groot Dwarsrivier, thus increasing the risk of transport of hydrocarbons and sediment by storm water into the river.

As such, although the habitat within Option 2 is not considered important from a floral or faunal perspective.

Option 3 – Least Preferred

From a soils and land capability perspective this option is not considered important for commercial cultivation, however it presents increased grazing opportunities due to the close proximity to the Klein Dwars and Groot Dwarsrivier and provides suitable and high quality grazing and browsing material for herbivorous species in the area. In addition, the small patches of moderately deep soils to the west of this option further qualifies this area for grazing and wildlife, even though a large portion has previously been subject to disturbances. In terms of faunal species, Option 3 extends towards the Groot and Klein Dwarsrivier systems which provide habitat linkages and movement corridors and Option 3 being located between the fenced area of the mine and these river systems, the habitat is fairly isolated from outside anthropogenic activities, notably that of hunting and snaring. As such, this area is considered important in terms of faunal species breeding, acting as an area of refuge. No floral SCC were observed, however the vegetation component is still largely intact, providing habitat to a number of indigenous terrestrial species.

In addition to potential impacts on faunal and floral habitat in the area, development of the truck parking in this area will also result in an increases area of hard surfaces as well as further vegetation clearing for connecting roads. This will result in increased water runoff into the Klein and Groot Dwarsrivier, carrying pollutants, leaked fluids from trucks and increased silt loads into the river systems located downgradient of Option 3. Although truck parking Option 3 falls outside of the flood lines, it is located within the 100m buffer of the both the Dwarsrivier and Springkaanspruit.

Based on the outcomes of the specialist studies, **Option 1 is the recommended option** for the Truck Parking.

1.g.i.1.a.3 Project 3: Fuel and Oil Storage

As explained in the project description, the mine is planning on appointing a new fuel supplier, Total. Due to transfer in service providers, the new supplier will be conducting studies on the current status of the existing tanks and in this process will remove the existing facilities and replace these with Total-type facilities. The mine will make use of this opportunity to optimise diesel and oil storage within the existing demarcated areas. Therefore no property or location alternative exists.

1.g.i.1.a.4 Project 4: Water Discharge

According to SAS, 2018, the habitat conditions in the Groot Dwarsrivier are good and can be considered analogous to Category B/C conditions. Over time, increased turbidity and sedimentation as well as increased algal growth proliferation has been observed and is indicative of increasing impact on the system.

Given the results of the aquatic ecostatus assessment it is clear that over time deterioration in water quality in the Groot Dwarsrivier has occurred due to the cumulative impacts of the upstream mining. The data also shows a general salinisation of the system over time which is indicative of a general deterioration in water quality over time. The data gathered on the aquatic macro-invertebrate community integrity indicates that over time both the overall South African Scoring System (SASS) Version 5 Rapid Bioassessment (SASS5) scores and the Average Score Per Taxon (ASPT) scores have decreased thus showing a decrease in the Ecostatus of the system over time. Although the results are variable, at the time of assessment the data showed that the Dwarsrivier Mine is not impacting on the aquatic macro-invertebrate community of the Groot Dwarsrivier. The Macroinvertebrate Response Assessment Index (MIRAI) scores indicate that the aquatic macro-invertebrate community is largely modified from natural conditions (Category D) and thus does not comply with the Recommended Ecological Category (REC) for the Groot Dwarsrivier.

The results of the assessment of the diatom community and application of the Specific Pollution sensitivity Index (SPI) indicate that the system shows signs of weak to moderate pollution with specific mention of salinisation and increased nutrient levels. The SPI index still however shows the system to be in a Largely Natural State (Category B).

Given the draft results of the study, considering the sensitive nature of the Groot Dwarsrivier, the cumulative impacts on the system, the toxicological properties in the receiving environment as well as the underground

(fissure) water to be discharged and the flow in the Groot Dwarsrivier, it is deemed possible that the proposed dewatering be undertaken without excessive impact on the Groot Dwarsrivier. It is however deemed absolutely essential that further flow and toxicity data be gathered prior to the commencement of dewatering and that during the dewatering activity, further Ecostatus flow and toxicity monitoring take place frequently in such a way as to allow the discharge rate to be adjusted to the appropriate dilution factors in the receiving environment.

The toxicological response in the Groot Dwarsrivier, prior to proposed discharge activities indicates that even prior to the discharge taking place there is a slight acute toxicological response in the receiving environment on both fish and bacteria. These results allow several significant conclusions to be drawn:

- Upstream cumulative impacts have already led to an acute toxicological impact on the receiving environment;
- The dilution capacity of the receiving environment is limited;
- The effective dilution ratios that can be achieved to avoid a significant acute toxicological response will be relatively high; and
- The cumulative impact of further discharge in the receiving environment has the potential to be significant. Thus if the planned dewatering is to proceed, discharge will need to be extremely carefully managed according to sound ecological principles which must be considered over engineering principles.

The results obtained from the analyses of the composite sample of water that would be discharged from the underground mine workings indicate that both pH and Dissolved Oxygen (DO) saturation comply with OREWRA (2001) recommendations. The EC concentration exceeds the recommendations stipulated by the OREWRA which state that the EC concentration for the January month should not exceed 80 mS/m Olifants River Ecological Water Requirements Assessment (OREWRA, 2001). Any discharge of water from the underground dewatering to the receiving aquatic environment could pose a significant risk to aquatic life, in terms of potential osmotic stress as well as an impact from specific chemical constituents. The degree of impact will be related to the volume of water reaching the system and the degree to which dilution in the surface water environment takes place along with the quality of dilution water in the receiving environment. The toxicological response by test organisms to a sample of the underground water to be discharged indicates that a significant acute toxicological response in the receiving environment on both fish (25%) and bacteria (50%) was evident in the sample from January 2018. In the April 2018 composite sample, no toxicological response by fish was observed while a significant response by bacteria (50% inhibition) was observed and a 95% inhibition in algal growth observed. In both instances a negligible response by invertebrates, represented by *Daphnia pulex*, was observed.

The dilution required for the composite effluent was calculated as 100% (effluent) divided by the minimum effect concentration (EC20). Definitive testing results indicated the lowest EC20 value was calculated for algae, namely 23. Dilution rate is then calculated as 100/23 which equals 4.35. A dilution factor (DFa) larger than this value (i.e. 1 part effluent to 4.35 parts receiving water) will be required to avoid acute toxic effects on the receiving aquatic ecosystem.

The data indicates that the toxicological properties are significantly variable in the underground water over time and express a varying impact on the various trophic levels over time. It is therefore deemed essential for further monitoring and testing to be undertaken to refine the proposed dewatering programme prior to commencement and that during the operational phase of the dewatering programme monthly testing and refinement of the allowable dewatering process take place until sufficient data is obtained to ensure accurate and appropriate decision making.

The initial discharge rate proposed by Dwarsrivier Mine management was 69l/s. However, given the sensitivity of the Groot Dwarsrivier, it was deemed appropriate that the rate of discharge not be defined by engineering principles but by ecological principles. Given the Ecostatus of the Groot Dwarsrivier, the REC for the system as well as the toxicological hazard classification of both the receiving environment and the proposed underground water to be disposed of and given the flow in the system, the rate of discharge could be defined. A minimum dilution factor of 1:4.35 was to be an achieved however given the sensitivity of the system a safety factor of a minimum of 10% is proposed. This calculation leads to a dilution factor of 1:4.78 which can be rounded to 1:5 for the sake of simplicity. Given a dilution ratio of 1:5 and based on the measurements undertaken in January 2018 a maximum discharge rate of 55l/s should be planned for to prevent a significant acute toxicological response. It is however deemed essential to take note that in winter the allowable discharge would be significantly lower due to reduced flow in the Groot Dwarsrivier and potentially reduced water quality and thus dilution capacity. It is deemed essential that further monitoring take place prior to initiating the discharge and

that during the operational phase monitoring of the discharge and toxicological properties of the underground water continue.

The precautionary principle as defined in Section 2(4)(a)(vii) of NEMA the risk assessment was applied considering knowledge gaps in this study regarding the proposed underground water discharge summarised as follows:

- The uncertainty of the cumulative impacts in the Groot Dwarsrivier from all mining activities both upstream and to a lesser degree downstream;
- The variability of the toxicological properties of the underground water and to a lesser degree the variability of the toxicological properties of the water in the Groot Dwarsrivier;
- The variability of flow in the Groot Dwarsrivier and in particular the lack of flow data for the Groot Dwarsrivier for the winter/low flow period; and
- Uncertainty of the ability of the mine to appropriately manage and adjust dewatering rates to the flow in the Groot Dwarsrivier to ensure the required dilution ratios are achieved.

Given the above, a precautionary approach was used in the risk assessment scoring. The results of the risk assessment indicate that the risk posed by the discharge is high and thus if inappropriately managed the impact on the Groot Dwarsrivier is likely to be very significant. If the dewatering program is well managed and the discharge rates constantly adjusted to ensure the required dilution ratios the risk can be reduced to a moderate risk.

It was the view of the aquatic specialist to undertake further testing on the Groot Dwarsrivier in Winter (toxicity tests and discharge monitoring). This will provide low flow parameters to assess. Due to the fact that further studies are required, consultation in this regard will first be undertaken with the DWS prior to initiation of future applications.

This project is therefore withdrawn from the EIA Application at this time.

1.g.i.1.b The type of activity to be undertaken

Limited alternatives for the type of activity to be undertaken are applicable to this project. The activities which are presented in this EIA Report are based on existing activities on site, which have been successful in the past (exploration activities), or where the operational considerations have indicated that upgrades or formalisation are required.

1.g.i.1.c The design or layout of the activity

As the Capital Projects are largely considered to be improvement projects through upgrading existing infrastructure and formalising areas which have indicated the need for such (security access, North Mine infrastructure upgrades, laydown area, reservoir, diesel storage areas and product stockpiles), the design and/ or placement of infrastructure are similar when considering alternatives. Therefore please refer to Section 1.g.i.1.a, which discusses the location of activities on site. The only design and layout activities which will be considered are for Project 1 and the Truck Parking as previously discussed, but re-emphasised in this section.

1.g.i.1.c.1 Project 1: Resource and Reserve Drilling

The location of the resource and reserve drilling programme is directly linked to the Mining Right Area. The demarcation of the drilling sites is as per a specific drilling plan with an exploration site located every 150m.

The placement of the drilling sites will be subject to the rules and requirements of surface right owners, in this case including Two Rivers Platinum Mine. The area where Dwarsrivier Mine will deviate from the previous drilling layout as per the Scoping Report, may be around infrastructure such as the Two Rivers Platinum TSF and Two Rivers Platinum Plant areas. Drilling will however still be located within the same properties and approximate locations.

Also refer to the previous section in which the new locations of drilling sites based on the outcomes of the specialist studies is presented (refer to Figure 6).

1.g.i.1.c.2 Project 2: Truck Parking Area (specific)

Three (3) main areas have been identified for the proposed parking area. With each of these options, the trucks will enter on the Two Rivers Platinum Mine Road and exit via the existing truck parking at the current mine entrance. Trucks will be travelling in one direction.

Please refer to Section 0.

1.g.i.1.d The technology to be used in the activity

The use of mobile sumps or constructed sumps as part of the drilling activities will be considered as part of the project development. However, at the present time it is foreseen that mobile sumps will be utilised as these will then be removed by licensed companies, without adding to the waste disposal system on site.

1.g.i.1.e The operational aspects of the activity

The only operational aspect for which there may be alternatives considered will be for the exploration activities. The placement of the activities are directly linked to the operational aspects of the drilling programme. The placement of the drilling sites are subject to two main considerations:

- The rules and requirements of surface right owners, in this case including Two Rivers Platinum Mine. The area where Dwarsrivier Mine will deviate from the previous drilling layout as per the Scoping Report, may be around infrastructure such as the Two Rivers Platinum TSF and Two Rivers Platinum Plant areas; and
- The outcomes of the specialist studies, as discussed previously.

1.g.i.1.f 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. Not allowing the exploration activities will result in a lost opportunity to understand the optimal mining potential within the area, not only based on economic considerations, but also in terms of safe mining considerations, as the drilling programme will determine the geological structures also present in more detail.

Not allowing activities such as the Truck Parking Area and the Low-Grade Product Stockpile area, will further lead to a restriction on the volume of this material to be produced and dispatched to the required markets. This will result in restricting the mine to market and supply available reserves, and could impact on the economics of scale of the mining operation.

The Capital Projects and Fuel and Oil Storage Project are important to the mine to optimise operational logistics within the Mining Right Area, and by not allowing the formalisation and improvement of activities such as proposed at the Security Access area, North Mine Infrastructure and South Mine Laydown area, would result in a lost opportunity for the mine in terms of continuous improvement.

1.g.ii 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 during the Draft Scoping Report review period and beyond:

1.g.ii.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 has undertaken the following consultations:

- Competent Authority - The DMR is the competent authority related to this application. The application formed the first of the consultations with the DMR. The EAP undertook to engage in on-going communications with the DMR (preferably directly with the allocated case officer).
- Departments that administer a law relating to the matter – The DWS has been directly informed via email and telephonic conversations and a meeting regarding the project was also undertaken. DWS will be the competent authority due to a WULA that needs to be submitted for the proposed project. The WULA is currently in progress.
- All organs of state which have jurisdiction in respect of the activity to which the application relates:
- National Level: The DEA - Under the "One Environmental System" rolled out by Government on 8 December 2014, licensing processes for mining, environmental authorisations and water uses have been streamlined. Under the One Environmental System, the Minister of Mineral Resources will issue environmental authorisations and waste management licences in terms of the NEMA, and the NEM:WA respectively, for mining and related activities. However, note that in terms of the new 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 (LDEDET) will form a primary commenting authority during the process. The provincial Heritage Resource authority (SAHRA) has been informed about the proposed project and has also provided comments.
- 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 Fetakgomo-Greater Tubatse Local Municipality is the local authority governing the proposed project area. The Municipality is responsible for managing the various wards which make up the proposed project area and surrounds. The Wards associated with the proposed project include Wards 2, 6, 27, 28, and 30. The ward councillors were a primary target for the proposed project in an effort to communicate the project to as greater stakeholder database as possible, especially considering that local people 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 was 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 development at Dwarsrivier Mine. Two Rivers Platinum (Pty) Ltd was identified as the only affected landowner. Portions 6 and 7 of the Farm Dwarsrivier 372KT belong to Two Rivers Platinum Mine. A meeting has taken with Two Rivers for 23 May 2018 and 12 June 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 Platinum, confirming that access on the said affected properties will be allowed to relevant specialists.
- Property Owners: Dwarsrivier Mine currently holds the mining rights over Portion 1 (Remaining Extent), Portion 0 (Remaining Extent), Portion 6 and Portion 7 of the farm Dwarsrivier 372KT. Surface rights of the mine extends onto Portion 1 (Remaining Extent), Portion 0 (Remaining Extent), and Portion 4, portion of Portion 3 of the farm de Grootteboom 373KT. The surface rights of Portions 6 and 7 of the farm Dwarsrivier 372KT are owned by Two Rivers Platinum Mine.

The most recent, updated stakeholder database is included within this report as Annexure 4.

All registered I&APs, which have a direct 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.g.ii.2 Stakeholder Identification and Notification

Please refer to Annexure 8 for copies of these notifications. Proof of email submissions can be requested from the EAP.

1.g.ii.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 visible locations close to the site, on 17 April 2018, in order to inform surrounding communities and adjacent landowners of the proposed project. Site Notices were place at the following locations:

Main Entrance to Dwarsrivier Mine

Entrance to Discard Storage Facility from Richmond Road

North Mine Entrance

Plant Entrance

1.g.ii.4 Background Information Documents

Key stakeholders, including those listed below, 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;
- Non-governmental organisations;
- General Public;
- Parastatals/ Service providers, and
- Adjacent Landowners.

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

1.g.ii.5 Advertisements

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

- The Steelburger Newspaper on 20 April 2018.

There are many local languages spoken in the area of which Sepedi are the most prevalent. As English is considered a universal language, the newspaper advert was placed in English only. The site notices were however translated into Sepedi. The proof of advert is attached as 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]. To date no such notifications have been received.

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

- Distribution of notification letters to Dwarsrivier Mine stakeholders via email and fax (where contact data is available); and
- A focus group meeting was held on 23 May 2018 and again on 12 June 2018 with representatives of Two Rivers Mine.

Any stakeholder who submits a comment during the course of this environmental authorisation process will automatically be registered on the project specific stakeholder database.

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

1.g.ii.6 Document Review

The Draft Scoping Report was placed on public review for a period of 30 days from **15 May to 13 June 2018**. Printed copies were available at:

- Dwarsrivier Mine (Pieter Schoeman)
- Two Rivers Platinum Mine (during the focus meeting held on 23 May 2018).
- Department of Economic Development Environment and Tourism Limpopo Province (LDEDET): Ms Mokgadi Mogashoa.
- Limpopo Department of Water and Sanitation (DWS): Ms Portia Munyai.
- Limpopo Department of Agriculture, Forestry and Fisheries (DAFF): Ms N.A. Mudau.
- South African Heritage Resource Agency (SAHRA): Online submission.
- Fetakgomo-Greater Tubatse Local Municipality: LED Manager Mr. N. Mokgotho.

Electronic Copies available from:

- Public Participation Office via dropbox link.

and

- Contact Batho Earth to request a copy on CD
- The BID was also mailed to the Department of Commission on Restitution of Land Rights: Mr Mmakolobe Mononyane.

Comments on the Draft Scoping Report were received from the following parties:

- Two Rivers Platinum (Pty) Ltd – Meetings held on 23 May and 12 June 2018.
- Mr. Mabilu: Department of Agriculture, Forestry and Fishery (DAFF) – Site Visit held on 23 May 2018
- Ms N.A. Mudau – Department of Agriculture, Forestry and Fishery (DAFF), formal comment letter received on 6 June 2018;
- SAHRA on 20 June 2018.

The final Scoping Report was acknowledged by the DMR on 26 June 2018.

The draft EMPr will also be submitted in hard copy to commenting authorities for a period of 30 days. Comments received will be included into the final report for submission to the DMR. The commenting period is from 17 August to 17 September 2018.

1.g.ii.7 Stakeholder Meetings

Due to the nature of the project, no general Stakeholder Meeting was held. The following focus meetings were however held:

- DAFF: 23 May 2018;
- Two Rivers Platinum Mine: 23 May 2018 and 12 June 2018;
- DMR: 11 June 2018; and

- DWS: 19 July 2018.

Minutes of the DAFF and Two Rivers Platinum Mine meetings are included in Appendix 4.

The purpose of the DMR Meeting conducted on 11 June 2018 was to introduce the project to the Department. Ms. M. Madau (Project Official), Ms. Ms. E Mulaudzi) (DMR), Ms. T Bekker (EnviroGistics) and Mr. P Schoeman (Dwarsrivier Chrome Mine) attended the meeting. The outcomes of the meeting can be summarised as follows:

- Three hard copies of the final EMPr report should be submitted to the DMR;
- The DMR will undertake a site visit during the EIA phase;
- The DMR was satisfied with the specialist studies proposed as part of the Plan of Study for EIA;
- The DMR was satisfied with the consultation process and also the involvement of Two Rivers Platinum Mine; and
- The EIA Report should specifically stipulate the closure cost for each of the projects.

A focus meeting took place with the DWS for 19 July 2018 at the DWS Lydenburg Offices with Ms. Portia Munyai. Please refer to Appendix 4 for the minutes of this meeting.

1.g.iii 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 project. This includes responses to the advertisements, response sheets, individual discussions with key stakeholders, and any other comments received during the consultation phase.

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 comments as included in Table 15 below have been received.

Table 15: Stakeholder Comments received

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	General Comments			
1	Please register the following people from Glencore Eastern Chrome mines: Lee-Ann Ryan-Beeming Craig Maule Japie van der Berg	20 April 2018 via e-mail and formal registration sheets completed.	Ms Lee-Ann Ryan-Beeming	Comment Noted, all three individuals were registered on the Dwarsrivier Mine EIA project Database.
2	Acknowledge the notification sent. The Department [Limpopo - Department of Economic Development, Environment and Tourism (LDEDET)] will await hard copies of Scoping Reports for commenting	20 April 2018 via e-mail.	Ms Mokgadi Mogashoa: LDEDET	Comment Noted, a hard copy of the draft scoping report was delivered to Ms Mogashoa.
3	My name is Aniah Makgoo and I wish to register as an Interested and Affected Party [I&AP]. I work for a wastewater treatment company and would like to participate by giving comments. Please send me more information about the project and information about how to register as an I&AP.	20 April 2018 via e-mail.	Ms Anjah Makgoo: General Public	Comment Noted. The Background Information Document with registration sheet was e-mailed to Ms Makgoo. She was also registered on the EIA project database.
4	Acknowledge the notification sent.	22 April 2018 via email.	Mr Henk Moen: Boulder Group of Companies: Adjacent property owner of Farm De Grooteboom 373KT (Portions 8 & 10)	Comment Noted, Mr Moen was registered on the Dwarsrivier Mine EIA project Database.
5	The office of the [Regional Land Claims Commissioner] RLCC: Limpopo hereby acknowledges receipt of your communication dated 26 April 2018. Kindly be informed that the office confirms the receipt of several individuals and community claims which were lodged in respect of the farm Dwarsrivier 372KT.	30 April 2018 via formal letter sent.	Mmakolobe Mononyane: Limpopo Commission on Restitution of Land Rights	Comment Noted, all the claimants and representatives were added to the project database and informed of the said EIA application at the Dwarsrivier Mine. Additional investigations will take place in order to determine the portions associated with the land claim.
6	Would like to register on the project database.	25 April 2018 via sms.	Mr Vincent Masie Mokebisa: General Public	Noted, Mr Mokebisa was registered on the project database.
7	She will review the Draft Scoping Report, discuss possible issues with the relevant representatives of Two Rivers Platinum and then provide feedback in this regard. She would also involve Mr. Francois Vermeulen, as Plant Manager of Two Rivers Platinum in the process.	23 May 2018 Focus Group Meeting.	Ms. Poseletso Sebako: Two Rivers Platinum	It was indicated that the consultants would have a follow-up meeting with Two Rivers Platinum during the EIA Phase of the project if required. Comments on the Draft Scoping Report were to reach the consultants by 13 June 2018. Dwarsrivier Mine has had meetings with the Two Rivers Platinum to discuss the location of the drilling pads and will be in continuous consultation regarding the logistics around the Truck Parking development and access roads.
8	Are there any challenges foreseen for Two Rivers Platinum not supporting this project? The Draft Scoping Report would be studied and integrated comments would be submitted.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum and Ms. Poseletso Sebako: Two Rivers Platinum	The Draft Scoping Report includes scoping specialist studies only. The detailed specialist studies would be done during the EIA. It is still important for Two Rivers Platinum to review the Scoping Report and Scoping specialists' studies as it would be ideal to include Two Rivers Platinum's requirements for specialist studies in the Plan of Study for the EIA. The list of specialist studies to be undertaken was provided. Biomonitoring and work as part of the specialist studies undertaken by Scientific Aquatic Services (SAS) have started. These specialist teams would be in the area on 23 and 24 May 2018.

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
				A hard copy of the Draft Scoping Report was given to Two Rivers Platinum.
9	The Department of Agriculture, Forestry and Fisheries [DAFF] acknowledges the receipt of the aforementioned report. The Department is the custodian of the National Forests Act (Act No 84 of 1998) as amended, which among others provide special measures for the protection of forests and trees. The list of trees is gazetted annually.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted.
10	Two Rivers Platinum intends to submit comments on the Scoping Report, in addition to these meeting minutes	12 June 2018 Focus Group Meeting,	P. Sebake: Two Rivers Platinum	Comment Noted.
	Mining and Property Related Comments			
1	It was indicated that the proposed truck parking area could impact on the entrance road of Two Rivers Platinum. These trucks would increase the volumes on the local access road which could result in delays of their buses transporting personnel to the mine. This could then again impact on their production capacity. Two Rivers Platinum thus cannot afford delays in terms of access to the mine. Other concerns relate to possible road surface damage.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	Comment Noted. It was explained that the trucks would use one lane where they enter the truck parking area (empty trucks) and exit (loaded trucks) elsewhere. Two Rivers Platinum must submit their concerns and shift challenges in this regard so that these issues can be listed, assessed and addressed. The aim of the introductory meeting was to initiate the engagement with Two Rivers Platinum. It is thus requested that Two Rivers Platinum comment on the Draft Scoping Report to ensure that there are no risks and liabilities for Two Rivers Platinum. Further information such as the following is also required in terms of Two Rivers Platinum's • requirements for access control; • requirements for rehabilitation; • restrictions along the TSFs, • buffer zones in terms of the TSFs; and • other issues and concerns These types of requirements can then be noted as conditions in the Dwarsrivier Environmental Management Programme (EMPr). Such conditions would have to protect both companies. Comment on any activities from Two Rivers Platinum would be welcomed, even with regards to activities to be undertaken on Dwarsrivier Mine' s property. Ms. Bekker suggested that Two Rivers Platinum send her the shape files of their surface rights area and EMPr. She will then overlay the Dwarsrivier Mine activities on those shape files and return the documents to Two Rivers Platinum in order to assist with the decision making regarding the drilling project. Please refer to Figure 6 of this report for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development.
2	Two Rivers Platinum requires more information on the proposed design of the truck parking area, shift patterns, schedules of use and volume increases.	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	The issues would be covered under the Dwarsrivier Mine EMPr. EnviroGistics requests a copy of the Two Rivers Platinum EMPr to determine the possible requirements as included in the development of the EMPr, as the Two Rivers Platinum rehabilitation commitments on its surface rights area will have to be considered as part of the drilling activities. This was noted and provided to EnviroGistics.

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
3	At this stage he would like to note the following: How will Two Rivers Platinum be legally accountable when Dwarsrivier Mine continues with their activities within the Two Rivers Platinum licensed area? How should reporting be undertaken when outside workers/ contractors are on their property? Who would remain responsible for the safety of those workers/ contractors and so forth?	23 May 2018 Focus Group Meeting.	Mr. Jakes Jacobs: Two Rivers Platinum	Environmental Authorisation is required before Dwarsrivier Mine can continue with the proposed activities, but various contracts with regards to e.g. safety, rules regulations around the plant, monitoring and so forth also need to be formalised between Dwarsrivier Mine and Two Rivers Platinum. Dwarsrivier Mine would have to have close contact with Two Rivers Platinum as the affected area would be on their surface rights area. Workers would possibly be managed in the same way that contractors are managed. Mr. Pieter Schoeman (Environmental Superintendent, Dwarsrivier Mine): Once Dwarsrivier Mine obtains an approval, discussions between Dwarsrivier Mine and Two Rivers Platinum should be undertaken and the necessary contracts have to be drawn up. These would relate to e.g. safety and health aspects and so forth. Please refer to Figure 6 for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development.
4	In which direction does the mine plan to develop?	23 May 2018 Site Visit.	Mr. Mabilu: DAFF	The proposed future plans of the mine were discussed by means of a map.
5	How deep was the open cast area?	23 May 2018 Site Visit.	Mr. Mabilu: DAFF	The open cast area was approximately 30-40 m in depth.
6	What type of wild animals are found within the mining areas?	23 May 2018 Site Visit	Mr. Mabilu: DAFF	Various types of antelope e.g. kudu are typically found, small carnivores and reptiles (refer to Annexure 6 for the ecological study).
7	The main objectives of the meeting is to discuss the positioning of exploration boreholes that fall within close proximity to Two Rivers Platinum infrastructure, notably the Plant and the TSF. The main message from Two Rivers Platinum is that there is no objection to the proposed drilling, but specific boreholes will have to moved, specifically those planned inside, or in close vicinity of the infrastructure mentioned above.	12 June 2018 Focus Group Meeting,	P Sebake: Two Rivers Platinum	Comments on the placement of boreholes planned for Year 1: Dwarsrivier Mine will not be able to drill within plant boundaries, and alternative positions will have to be pegged, preferably outside the boundary fence of the plant. The boreholes planned for Year 1 at the Two Rivers Platinum TSF can perhaps be relocated to the old Richmond Road, where it will not obstruct Two Rivers Platinum operations. A walkthrough of the proposed borehole locations must be conducted by Dwarsrivier Mine and Two Rivers Platinum to confirm the placement of boreholes and the practicality of drilling in some areas. Main operational areas and office areas are to be considered no-go areas for drilling. The main reason for this is that access to these areas will be a logistical challenge. Dwarsrivier confirmed that a WUL will be obtained if required by the DWS for the drilling inside the flood lines. Please refer to Figure 6 for the final location of the drilling sites, also refer to Table 67 for the management measures and planning commitments regarding the exploration sites and truck parking development. Note that the drilling in flood lines have been excluded from the project layout.
8	Two Rivers Platinum requested that Dwarsrivier Mine send dwg Files to Two Rivers Platinum so that the placement of the boreholes can be overlain on the Two Rivers Platinum infrastructure more accurately.	12 June 2018 Focus Group Meeting.	P Sebake: Two Rivers Platinum	Dwarsrivier Mine will send this to Two Rivers Platinum.

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	There are no specific Two Rivers Platinum buffer areas around the TSF, but Dwarsrivier Mine should take note of the 400kv Eskom line servitude.			Comment Noted regarding Eskom powerline. Eskom was also informed of the said EIA application.
9	Two Rivers Platinum reiterated the challenge currently experienced because of the trucks parking on the main road outside the Dwarsrivier Mine plant entrance, and indicated that they (Two Rivers Platinum) also support the development of a new truck parking area at Dwarsrivier Mine.	12 June 2018 Focus Group Meeting.	P Sebake: Two Rivers Platinum	Comment Noted.
	Ecology Related Comments			
1	Tree species existing within the area include *Boscia albitrunca*, *Elaeodendron transvaalensis*, *Sclerocarya birrea* subsp. *caffra*, *Balanites maughamii* and *Lydenburgia cassinoides*. Tree species mentioned above are protected in terms of the National Forests Act, 84 of 1998. All activities should be done in compliance with Section 7(1) and Section 15(1) of the National Forest Act. In terms of Section 7(1) of this Act no person may cut, disturb, damage or destroy any indigenous living tree in a natural forest or possess, collect, remove, transport, export, purchase, sell and donate except in terms of a licence issued by the minister. In terms of Section 15(1) no person may cut, disturb, damage, destroy or remove any protected tree, or collect transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under licence granted by the minister.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted. The applicant will ensure that the proposed developments adhere to Sections 7(1) and 15(1) of the National Forests Act. If a licence is needed to undertake any of the said activities, an application will be lodged with the Department. An ecological assessment for the developments is currently taking place. The detailed list of tree species within the study area will be provided as part of the draft EIA. Please refer to Annexure 6 for the ecological report.
2	*Lydenburgia cassinoides* (Sekhukhune bushman's tea) is confined to Sekhukhune District Municipality only. Any activities which lead to the impact to this floral species should be avoided at all cost. If any manner avoidance cannot be adhered to, reasonable steps should be taken to ensure its existence. It is also on brink of extinction due to over-utilisation from the surrounding communities. The Department requires a plan that will ensure its continuous existence within the area.	6 June 2018, former comments received on the Draft Scoping Report.	Ms N.A. Mudau - DAFF	Comment Noted. The mine will ensure that no *Lydenburgia cassinoides* (Sekhukhune bushman's tea) is damaged in any way during the proposed new developments. The impact on these trees will be avoided at all cost. Three options were considered for the Truck Parking, with the chosen option, Option 1, the most suitable according to the ecological study. Please refer to Annexure 6 for the ecological report. Please refer to Part B of this report, which details the management measure proposed by the Ecologist and EAP.
	Heritage Comments			
1	South African Heritage Resources Agency (SAHRA) Archaeology, Palaeontology and Meteorites (APM) Unit accepts the Heritage Scoping Report and its recommendations and awaits the submission of the Heritage Impact Assessment (HIA) report. The development is not mapped on the SAHRIS palaeomap, which prevents SAHRA from assessing the palaeontological sensitivity of the mine right area. SAHRA is unable to determine the impacts to any fossiliferous rocks or sediments within the development footprint. Therefore, SAHRA requires an assessment of palaeontological resources conducted by a suitably qualified palaeontologist.	Letter Dated 20 July 2018.	Nokukhanya Khumalo	Please refer to Annexure 6 and Section 1.g.iv.1.l, which includes the findings of the Heritage and Paleaontological Study.
	Water Related Comments			
1	My interest is solely on the discharge of fissure water into Dwarsrivier and improvement of water quality on the river. My concern is the possibility of contaminating the river system with chromium. Chromium is a heavy metal which tends to undergo chemical speciation and its main stable oxidation state is hexavalent and trivalent chromium. Although trivalent Chromium is as essential human nutrient at lower concentrations, hexavalent chromium is carcinogenic and mutagenic even at lower concentrations. This can affect aquatic life in the river and can impact the community negatively as domestic animals drink from the river and can in turn have an impact on the health of the community as a whole. I would like to know the mitigation plan of the mine on this issue. A number of heavy metals can have an impact on the water. The water can however be tested at an accredited laboratory for evident heavy metals and later be treated to reduce the concentrations of heavy metals to acceptable limits, prior to discharge into the river. The mine can have a small plat whereby it will treat its own water prior to discharge. There are other determinants that the water can be tested for such as total suspended solids, total suspended solids, dissolved metals etc. The water must be sampled from upstream of the river and downstream of the river to check if the water from the mine is improving the quality of water of	30 April 2018 via e-mail.	Ms Anjah Makgoo: General Public	This project has been excluded from the current Environmental Authorisation Process. Further hydrological and aquatic studies are required to determine the impact of the discharge onto the Dwarsrivier system.

NO.	THEME: GENERAL COMMENTS / ISSUES			
	ISSUE RAISED	**DATE AND HOW ISSUE WAS RAISED**	**COMMENTATOR**	**RESPONSE**
	deteriorating the river system. However I would like to have more information on how the mine is planning to check the quality of the water in the river.			
2	A meeting was held with the DWS to discuss the flowing: Should the product stockpile be applied for as a Section 21g water use? Should the mine apply for Section 21c&i regarding the temporary crossings of the drainage lines for the exploration roads? Should the mine apply for GN704 exemption for the Truck Parking located outside of the flood line, but inside of the 100m buffer of a watercourse? May the mine utilise discard rock for the use of road construction?	19 July 2018, meeting with DWS.	Ms. Portia Munyai, Mr. Adam Ramakgadi and Ms. Mathabo Kgosana: DWS	Should the product stockpile be applied for as a Section 21g water use? Yes, a Section 21g water use must be applied for. Should the mine apply for Section 21c&i regarding the temporary crossings of the drainage lines for the exploration roads? The DWS will consult with the specialist department and advise the mine accordingly. Should the mine apply for GN704 exemption for the Truck parking located outside of the flood line, but inside of the 100m buffer of a watercourse? The DWS will consult with the specialist department and advise the mine accordingly. May the mine utilise discard rock for the use of road construction? The mine will have to apply for GN704 exemption for the use of discard rock.

1.g.iv 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.g.iv.1 Baseline Information

1.g.iv.1.a Climate

1.g.iv.1.a.1 Temperature

Dwarsrivier 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.

1.g.iv.1.a.2 Rainfall

The proposed Project falls primarily within quaternary catchment B41G. The monthly rainfall for this catchment was obtained from the Water Resources of South Africa Study 2012, and is indicated Table 16. The Mean Annual Precipitation (MAP) for the study area is 650mm, with the wettest months occurring from November to January, and the driest months from June to August.

Table 16: Monthly rainfall for quaternary catchment B41G (green highlights driest months)

Month	Monthly Rainfall (mm)
January	111.5
February	88.3
March	75.5
April	41.8
May	14.8
June	6.2
July	5.2
August	5.8
September	20.6
October	60.0
November	111.7
December	108.7
TOTAL	**650**

1.g.iv.1.a.3 Evaporation

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

Table 17: Evaporation Summary

Month	Symonds Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
January	165.0	0.84	138.6
February	137.6	0.88	121.0
March	135.8	0.88	119.5
April	104.4	0.88	91.9
May	87.9	0.87	76.5
June	71.4	0.85	60.7
July	78.2	0.83	64.9
August	103.5	0.81	83.8

Month	Symonds Pan Evaporation (mm)	Evaporation Factor	Open Water Evaporation (mm)
September	134.1	0.81	108.6
October	161.7	0.81	131.0
November	152.6	0.82	125.1
December	168.0	0.83	139.4
TOTAL	**1500**	**N/A**	**1261**

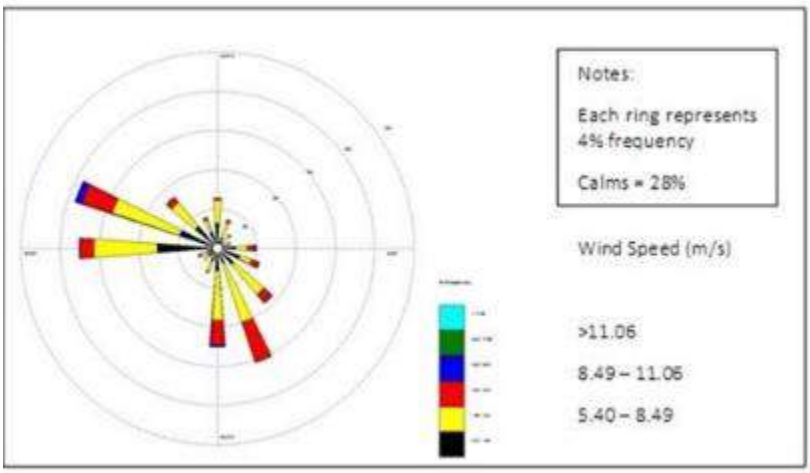
The MAP is less than the Mean Annual Evaporation (MAE) and therefore the site is classified as a water deficit site, when considering the following table:

Table 18: Natural Water Balance (rainfall vs. evaporation)

Month	Rainfall	Open Water Evaporation (mm)	Difference
January	111,50	138,60	-27,1
February	88,30	121,00	-32,7
March	75,50	119,50	-44
April	41,80	91,90	-50,1
May	14,80	76,50	-61,7
June	6,20	60,70	-54,5
July	5,20	64,90	-59,7
August	5,80	83,80	-78
September	20,60	108,60	-88
October	60,00	131,00	-71
November	111,70	125,10	-13,4
December	108,70	139,40	-30,7
TOTAL	**650,00**	**1261,00**	-611

1.g.iv.1.a.4 Wind

Wind can play an important role 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. The wind rose of the closest weather station recording wind is Lydenburg (W0554816) is presented in the figure hereafter. According to this information the dominant winds are southeasterly and northwesterly winds.



Graph 2: Wind data.

1.g.iv.1.a.5 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.g.iv.1.b Topography

The regional topography can be described as undulating with numerous mountain ridges and valleys. A mountain ridge runs along the western boundary of the Mining Right Area where a maximum elevation of approximately 1 630 metres above mean sea level (mamsl) is reached. From this ridge, the elevation drops off to approximately 900 mamsl near the confluence of the Klein and Groot Dwarsrivier. The elevation rises once again to approximately 1 110 mamsl, near the north-eastern corner of the Mining Right Area, where a small koppie is located. Steep slopes occur along the sides of the mountain ridges (refer to the following figures).

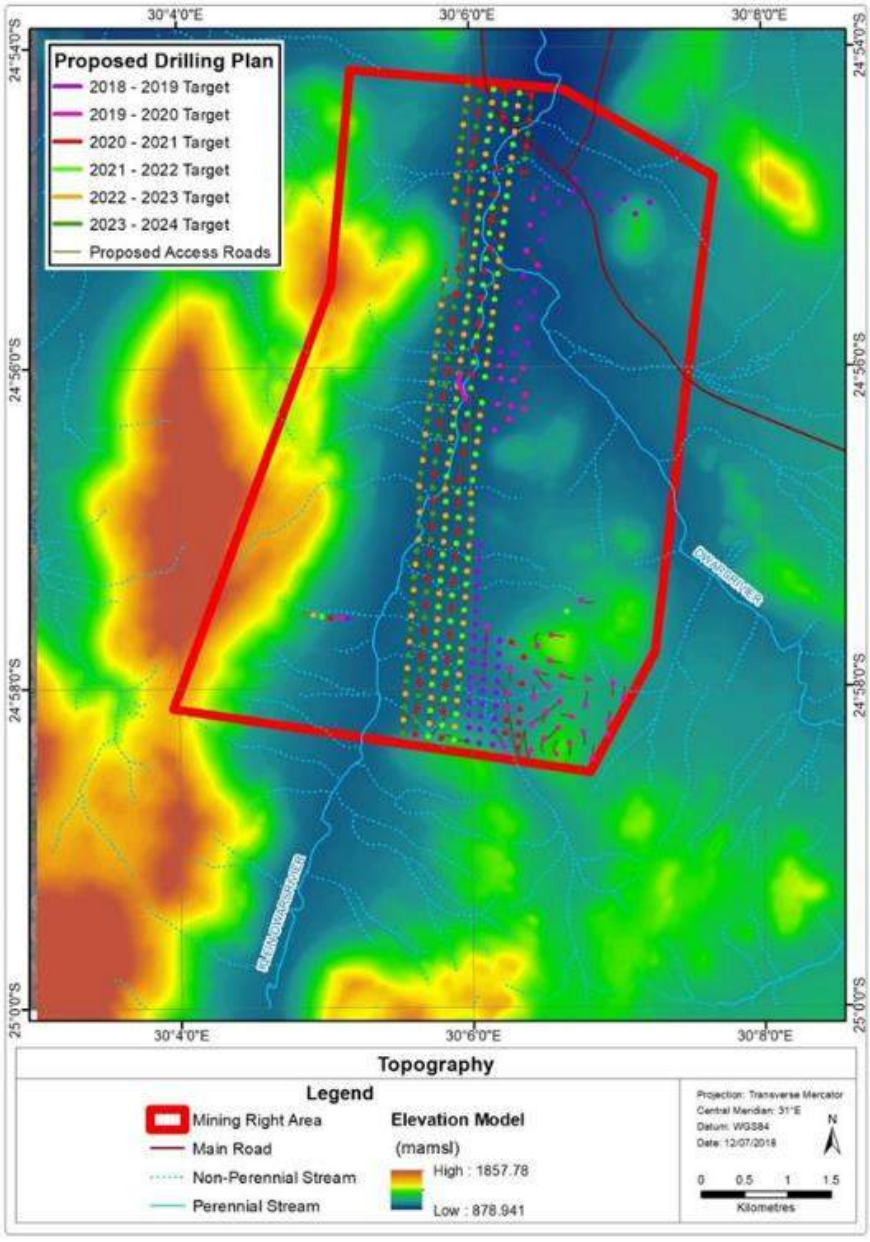


Figure 19: Topography of the Project

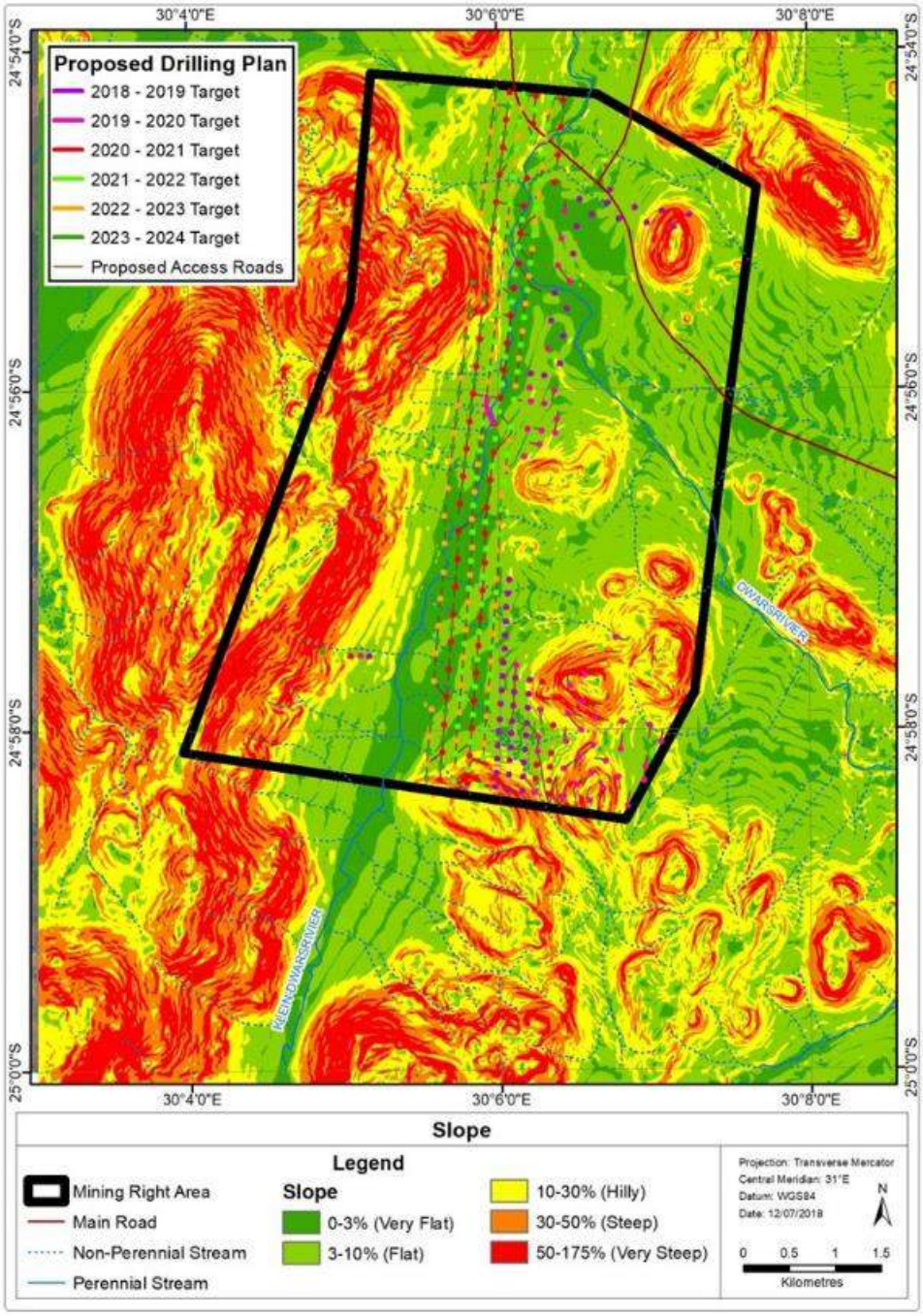


Figure 20: Slope of the Project

The areas where the infrastructure is proposed are mostly gradual. However, the exploration activities will be located among the mountainous setting towards the west of the Mining Area, with various drainage channels arising from the slopes – please refer to the following figures for an illustration.

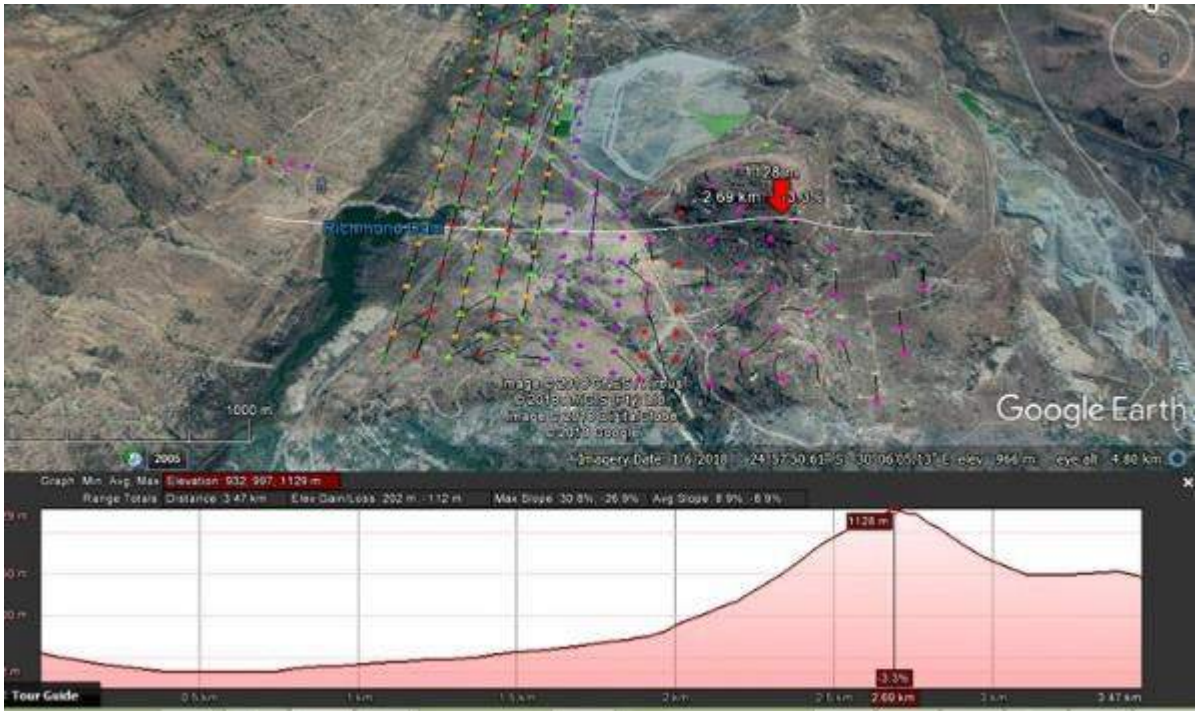


Figure 21: Southern boundary of the Exploration activities

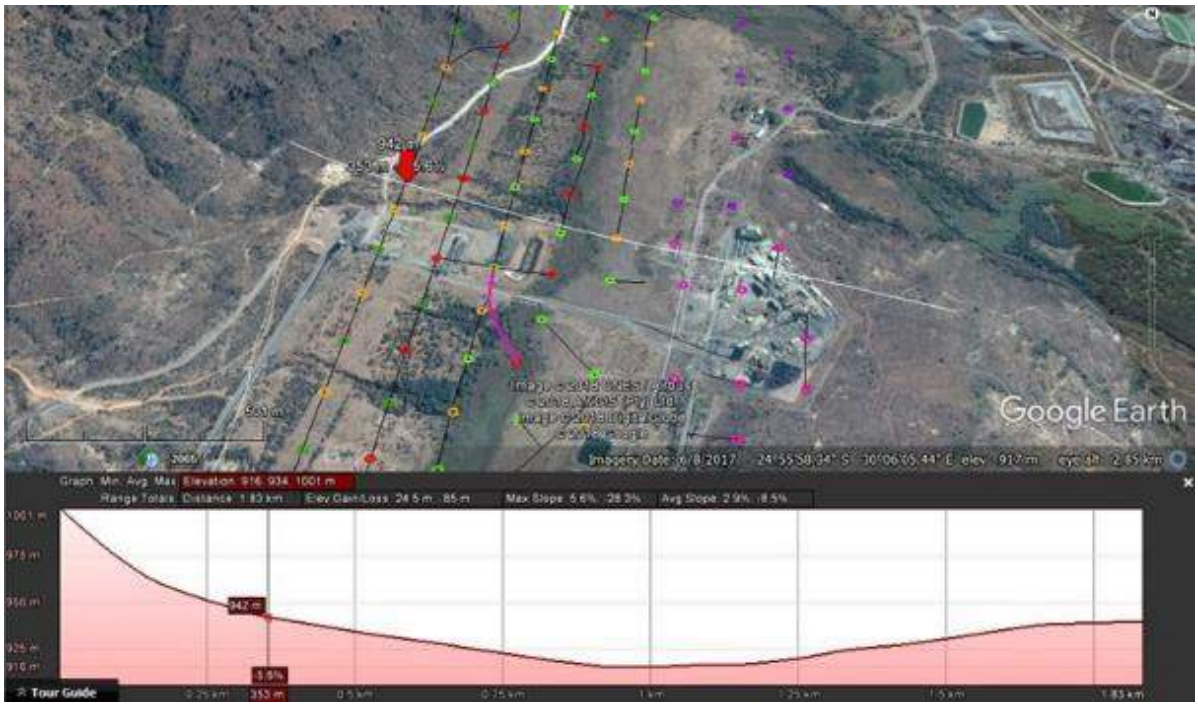


Figure 22: Centre of the Exploration activities

Figure 23: Northern boundary of the Exploration activities

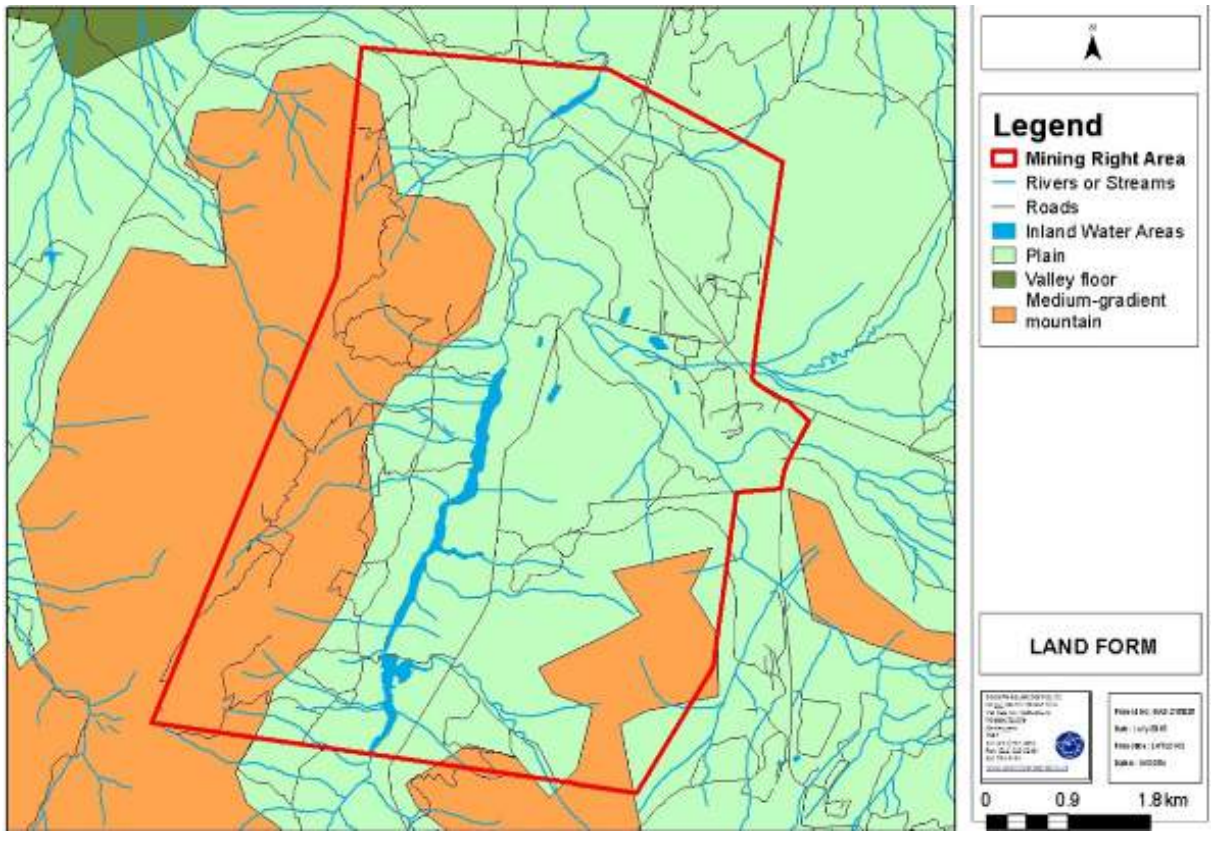


Figure 24: Landform

1.g.iv.1.c Geology

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 pyroxinite. 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.

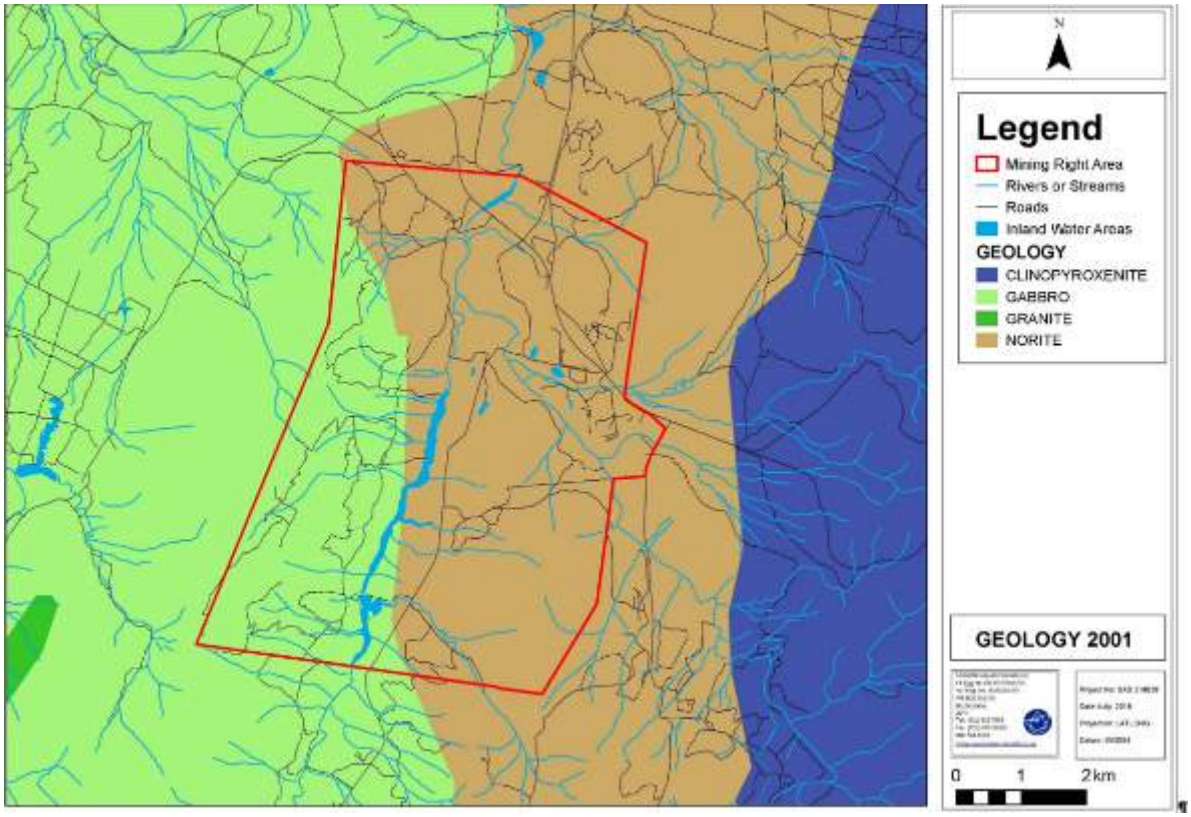


Figure 25: Geology

1.g.iv.1.d Soils and Land Capability

A specialist study was commissioned for the purposes of this report by SAS to provide input in terms of the understanding of the soil characteristics on site. Please refer to Annexure 6 for more detail.

1.g.iv.1.d.1 Dominant Soil Types

According to the soil-terrain (SOTER) database and the 1:250 000 geological map of South Africa, the majority of the study area is underlain by pyroxenite rock formations (parent material) while the remaining portions is underlain by gabbro (Figure 26). The SOTER database indicates that the majority of the study area comprises strongly weathered acid soils with low base saturation, classified as Luvisols (LVk) with the remaining portions classified as Lithic Leptosols (LPq).

The specialist made use of existing soils data from the Two Rivers Platinum EMPs, Dwarsrivier Mine EMPs and confirmed these during site investigations. According to the specialist outcomes the area is dominated by shallow soils of Mispah/Outcrop and Glenrosa/Mayo/Mispah forms which collectively constitute of approximately 71.41% of the total investigated area, whilst arable soils of Hutton and Bonheim occupies approximately 1.55% of the total investigated area. The shallow nature of the dominant soil forms can be largely attributed to limited rock weathering or rejuvenation through natural erosion on steeper, convex slopes.

Table 20: Soils and land within study area

Soil Form	Total Area (Ha)	% Areal Extent
Hutton	3.16	0.09
Bonheim	51.80	1.46
Acardia	126.54	3.58
Rensburg and Alluvial soils	198.45	5.61
Glenrosa/Mayo/Mispah	1217.40	34.41
Brandvlei/Etosha/Gamoep	247.39	6.99
Mispah/Outcrop	1308.90	37.00
Mining and Infrastructure (Including roads and water dam)	97.59	2.76
Witbank (Witbank (anthrosols))	286.33	8.09
Total Area Investigated	**3537.60**	**100**

** Note the summary table above summarises all the aspects found within the investigated area (including water dams, roads, mining and infrastructure), whilst the land capability table (Table 21) only focus on classifying the land capability of the open areas, and excludes all areas of infrastructure relating to mine activities.*

The remainder of the area is occupied by Acardia, Brandvlei/Etosha/Gamoep soil forms, mining and associated structures (i.e. mine plant complex, stockpile areas, Pollution Control Dam (PCD), office areas and tar roads), Witbank (anthrosols) soil forms, as well as soil forms which are associated with freshwater features such as Rensburg and Alluvial soils. The Witbank soils have been extensively disturbed such that no recognisable diagnostic soil morphological characteristics could be identified, corresponding to anthrosols in the international soil classification terminology.

The Glenrosa and Mispah soil forms are generally less than 0.3m deep, but may be as much as 0.6m deep. The Hutton Form soil forms are generally in excess of 0.60m deep to as deep as 1.50m, but shallower examples occur, especially adjacent to the Glenrosa soils.

Please refer to Figure 28, Figure 29 and Figure 30 for the soil forms identified within the Mining Right Area and within the vicinity of the various projects that forms part of this EIA specifically.

The findings of this assessment suggest that the relevant soil limiting factors within the area for land capability and land use potential include the following:

- Shallow effective rooting depth due to shallow indurated bedrock of the Mispah, Glenrosa, Mayo soil forms. As such, these soils are not considered to contribute significantly to agricultural productivity;
- Susceptibility to erosion of Brandvlei/Etosha/Gamoep soils forms are associated with the southern portion of the area (please refer to Figure 31);
- Limited rooting depth due to periodic waterlogging of the Rensburg soil forms associated with the watercourses. Preservation of these soils for conservation purposes takes precedence, according to the NWA; and
- Lack of soil medium for plants and crop growth exists within the rocky outcrop, mine infrastructure, surface water areas and Witbank (anthrosols) soil types.

1.g.iv.1.d.2 Land Use and Capability

Current land use activities associated with the larger region are generally dominated by wildlife and wilderness, in addition to intensive underground mining operations. Fallow lands were also identified on the north central portion of the area and are occasionally used for grazing. Note that although not present at this time, it is important to understand that the northern areas where fallow lands are present has been approved for the expansion of the Discard Storage Facility and the establishment of new Eskom Sub Stations – The exploration activities should therefore also consider that areas approved for future development should rather be earmarked for drilling activities than areas not earmarked for future construction No current agricultural activities were observed within the proposed project areas and surrounds (Figure 27, Figure 32 and Figure 33).

The identified soils were classified into land capability classes using the Scotney *et al*. 1987) Land Capability Classification system, as presented in Figure 34 and Figure 35. Please refer to Table 21.

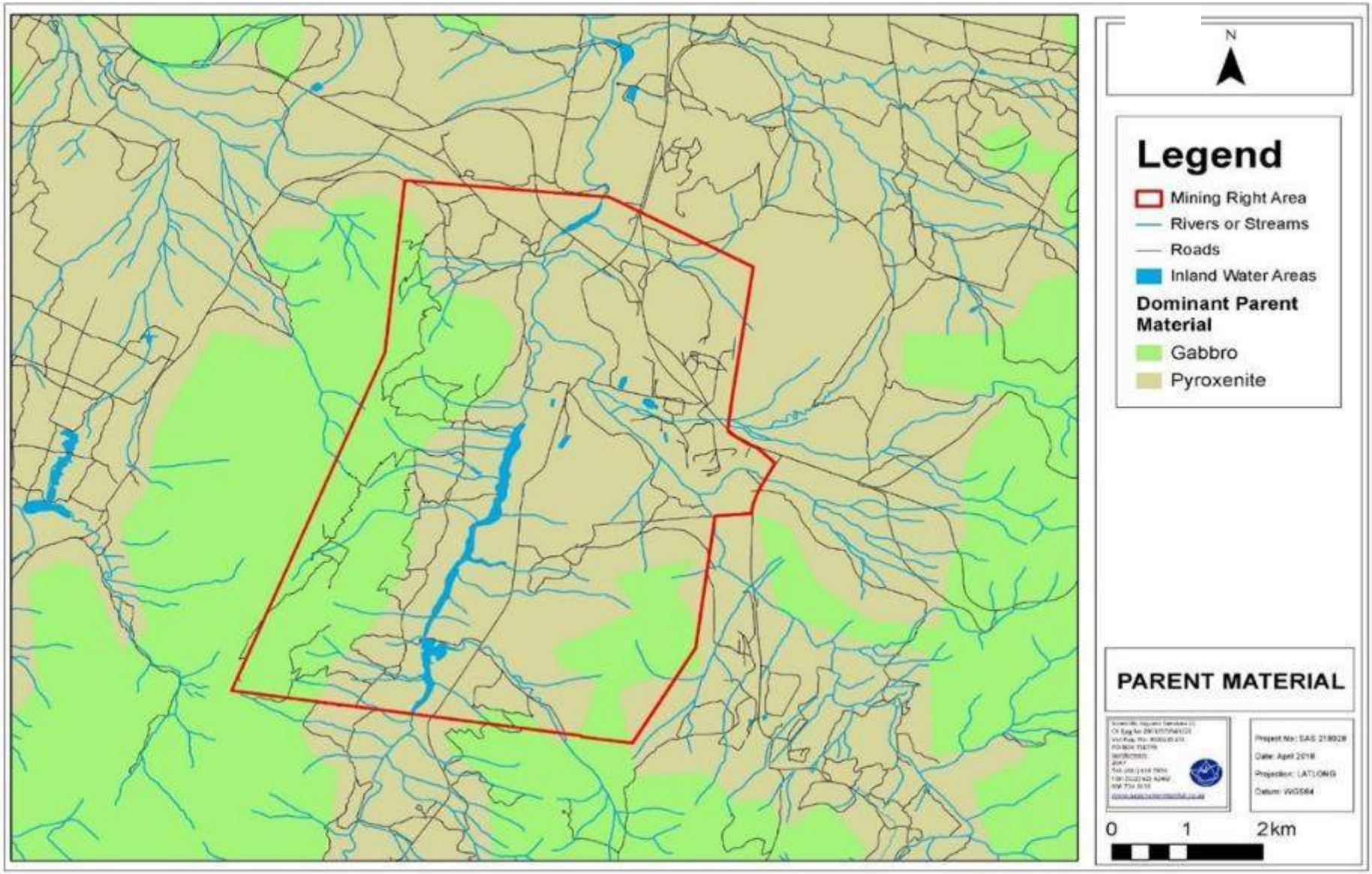


Figure 26: Parent material associated with the mining right area and surrounding areas according to the SOTER Database

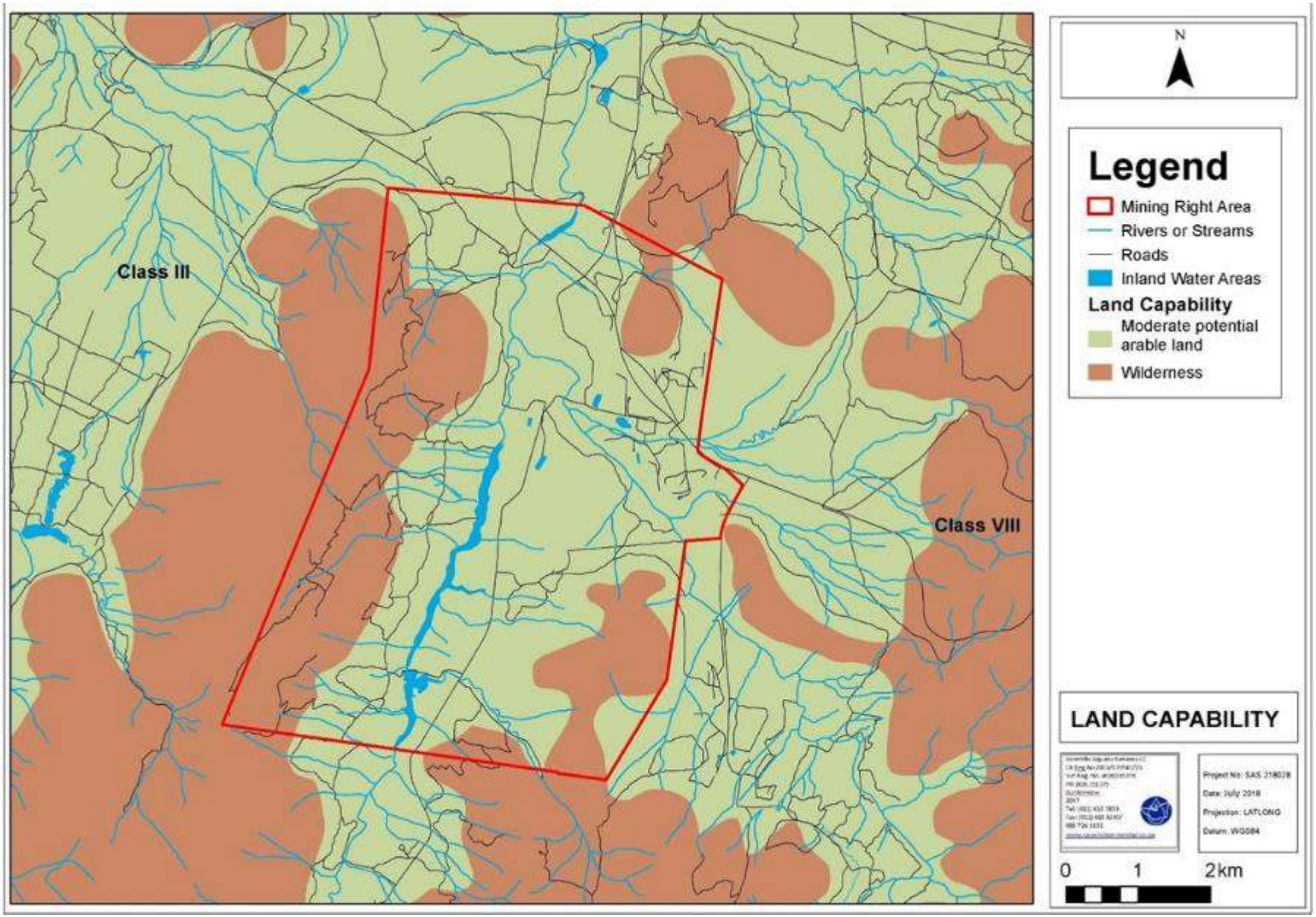


Figure 27: Land Capability Map

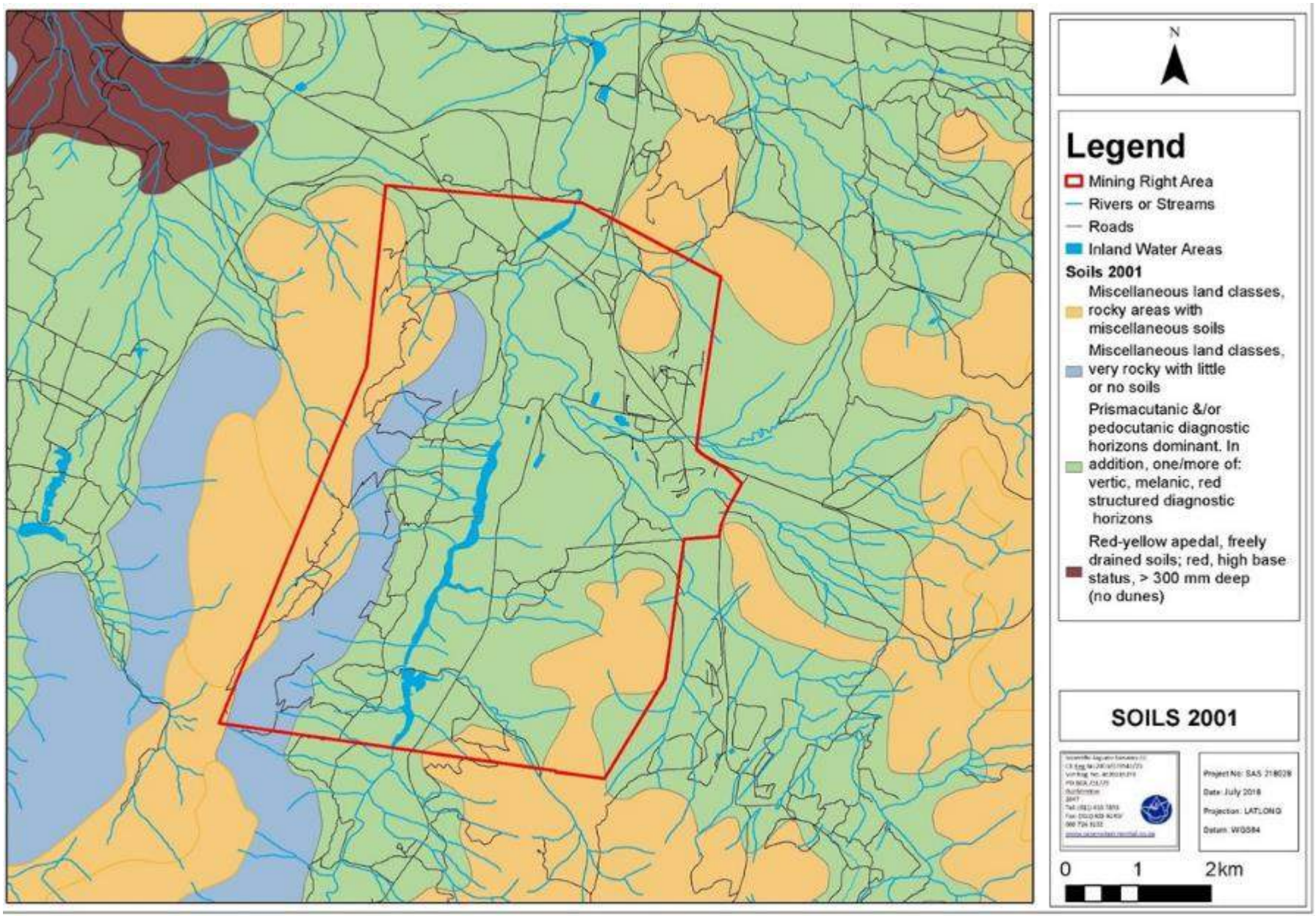


Figure 28: Soils, 2001 (SAS, 2018)

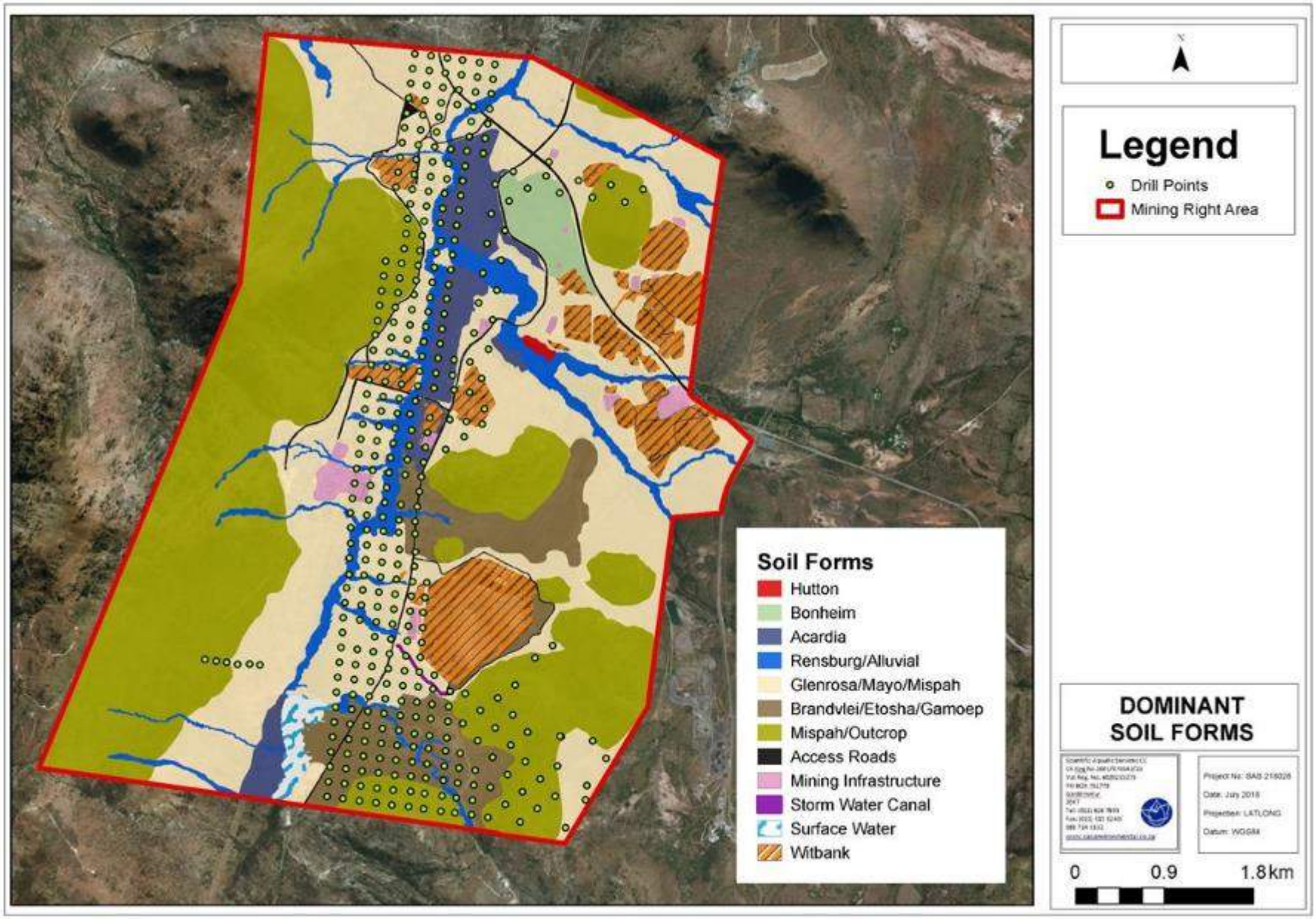


Figure 29: Soil map depicting identified soil forms associated with the drilling points within the area

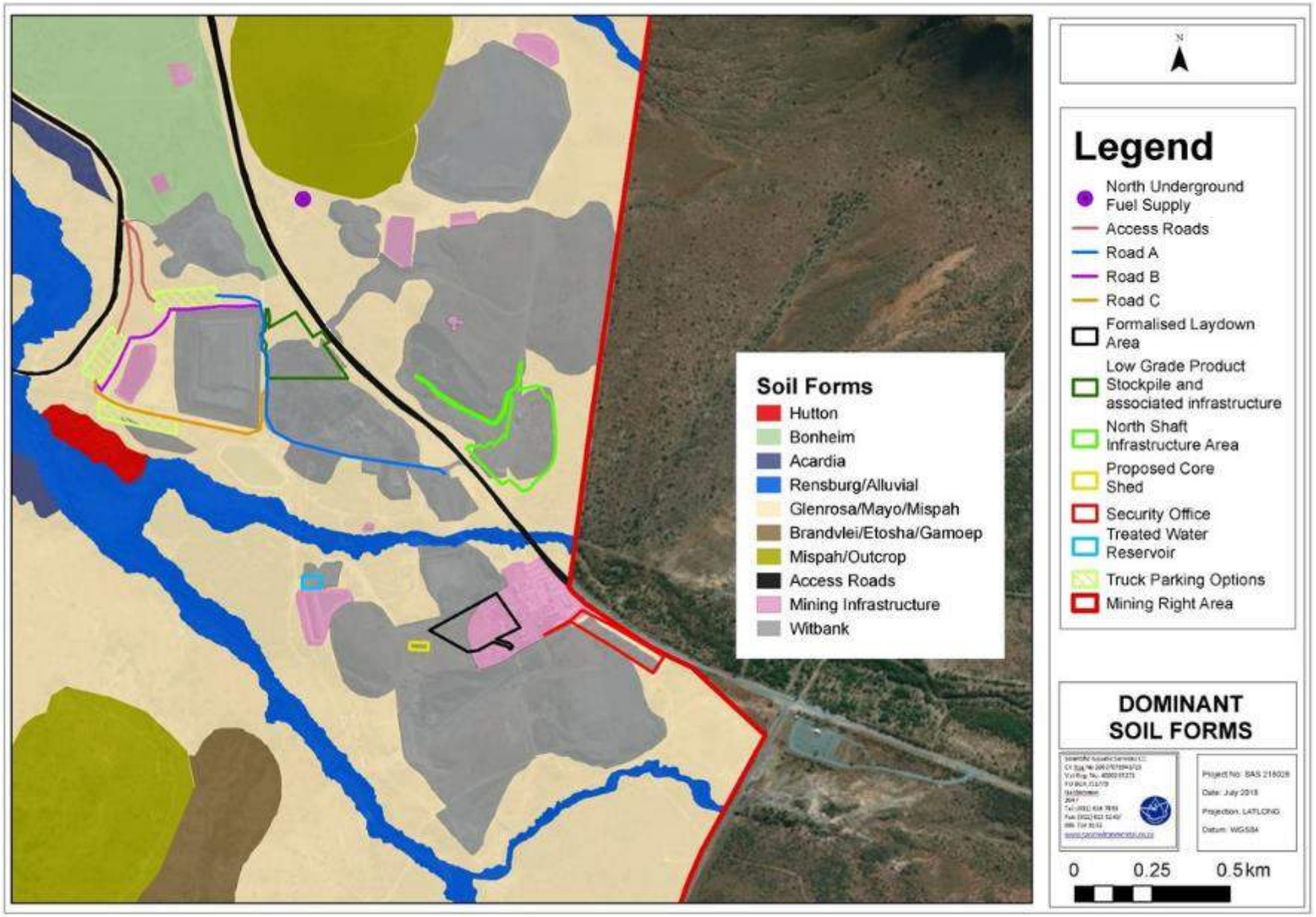


Figure 30: Soil map depicting identified soil forms associated with the infrastructural developments

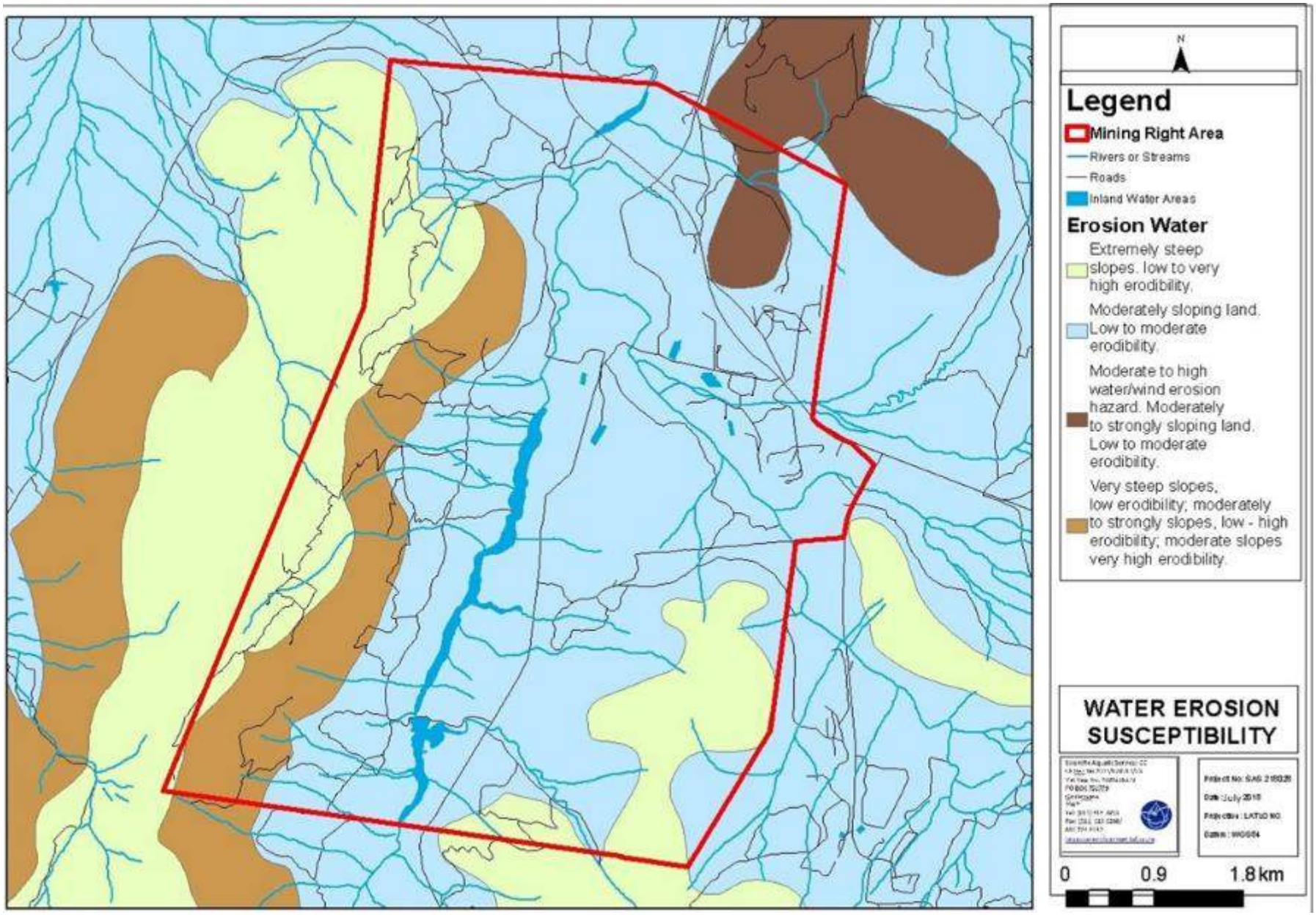


Figure 31: Soil susceptibility to water erosion (SAS, 2018)

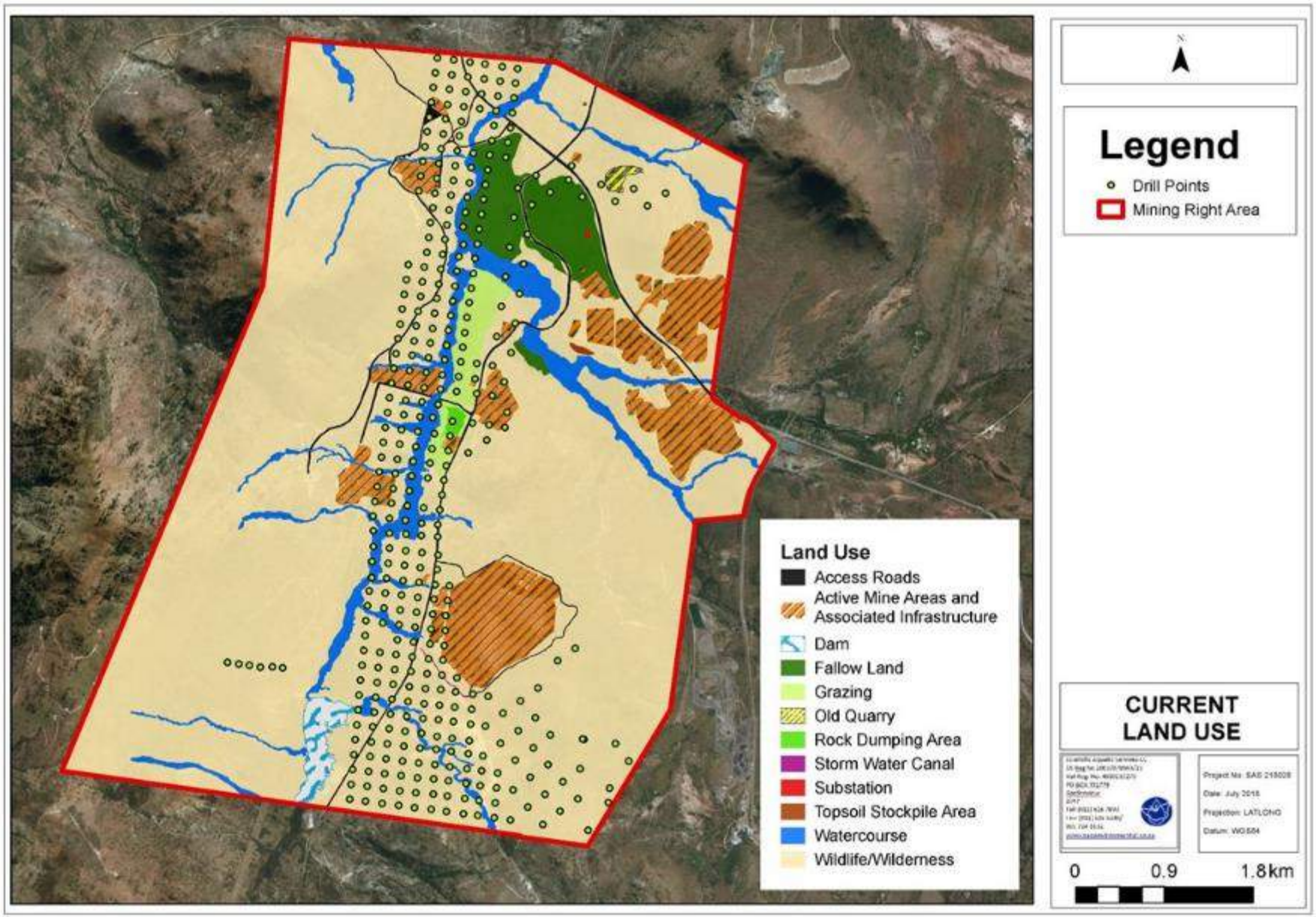


Figure 32: Map depicting current land use overlain by proposed drilling plan within the area

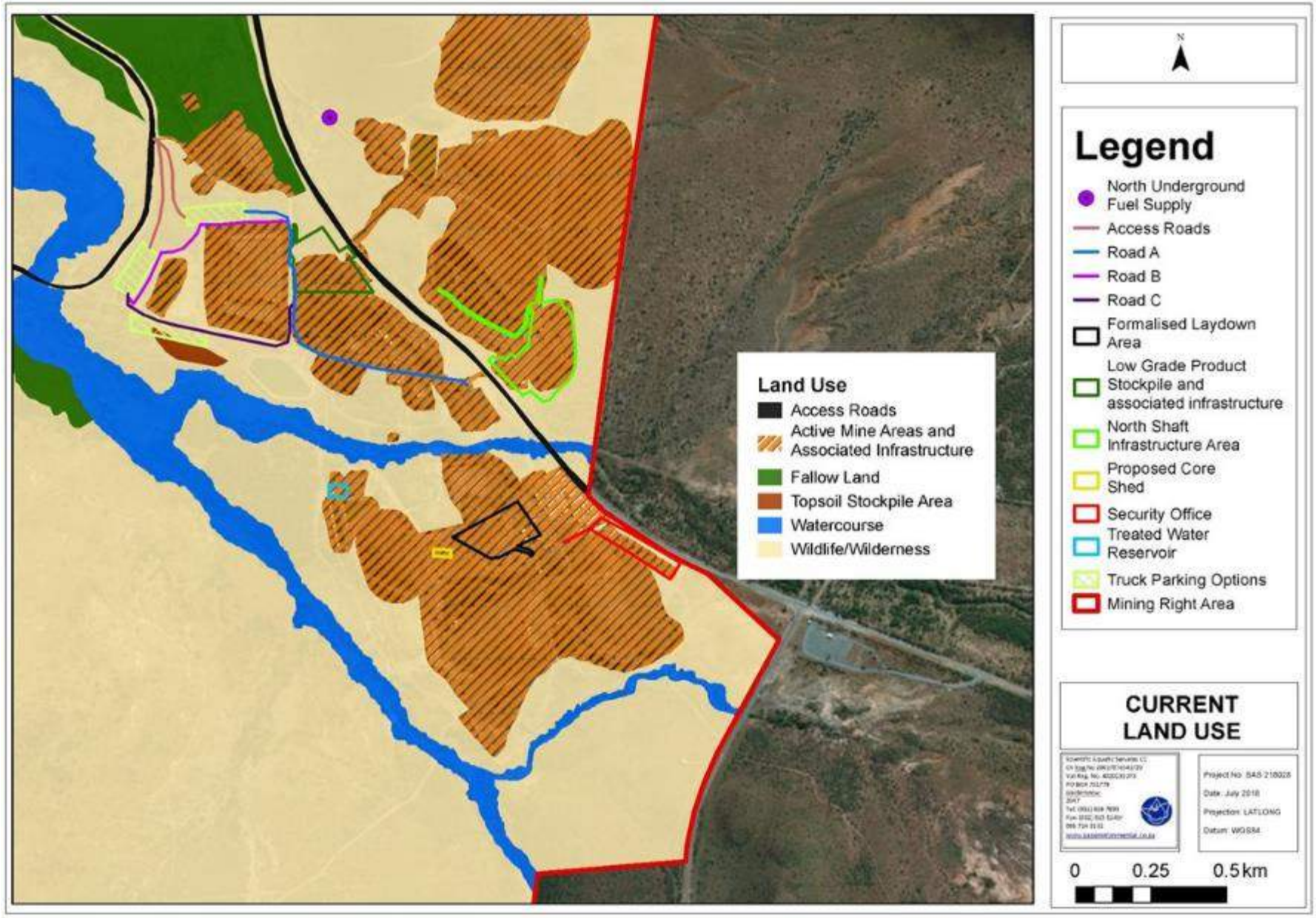


Figure 33: Map depicting land use overlaid by proposed mining infrastructure

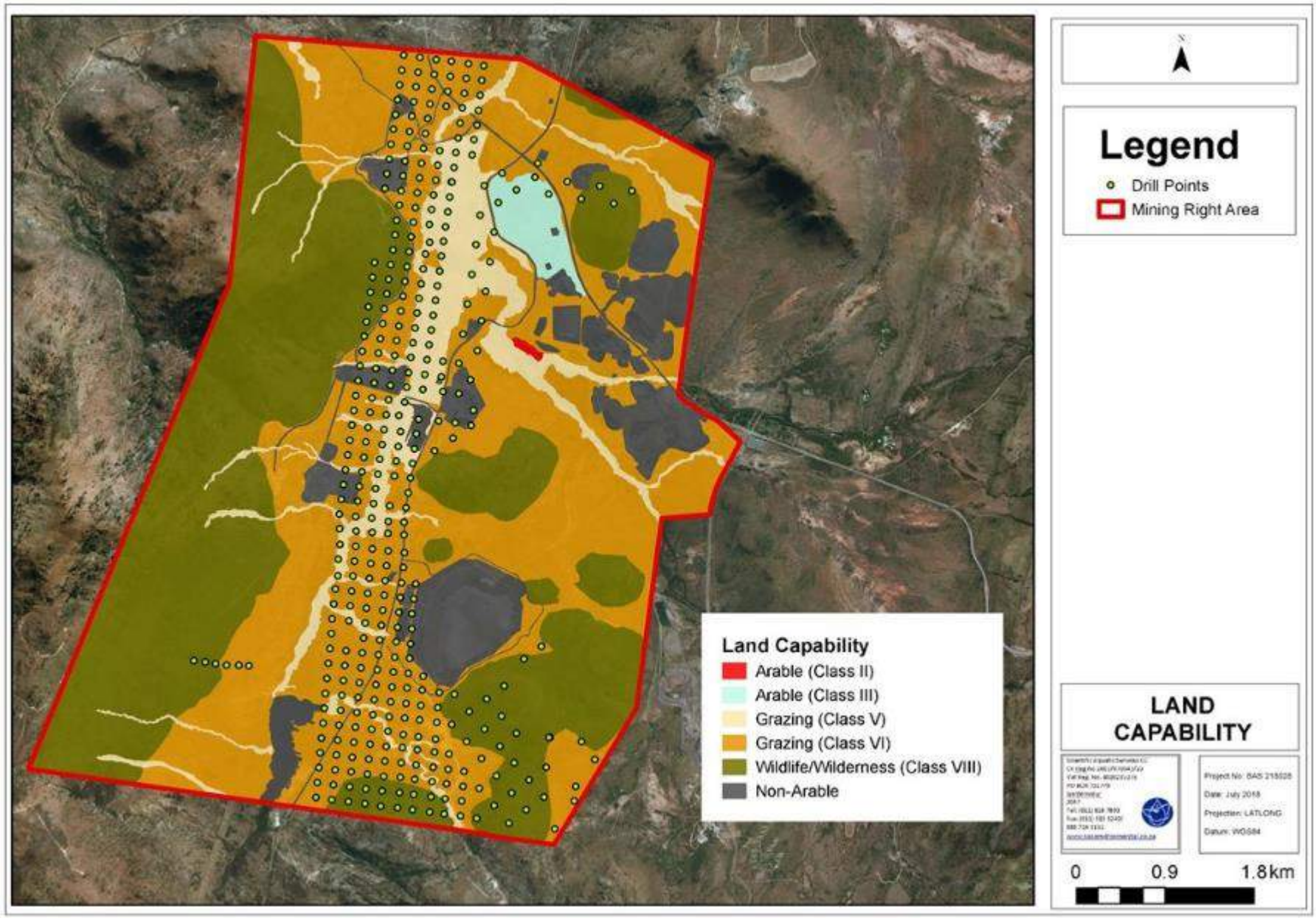


Figure 34: Map depicting land capability classes of soils associated with the drill sites within the area

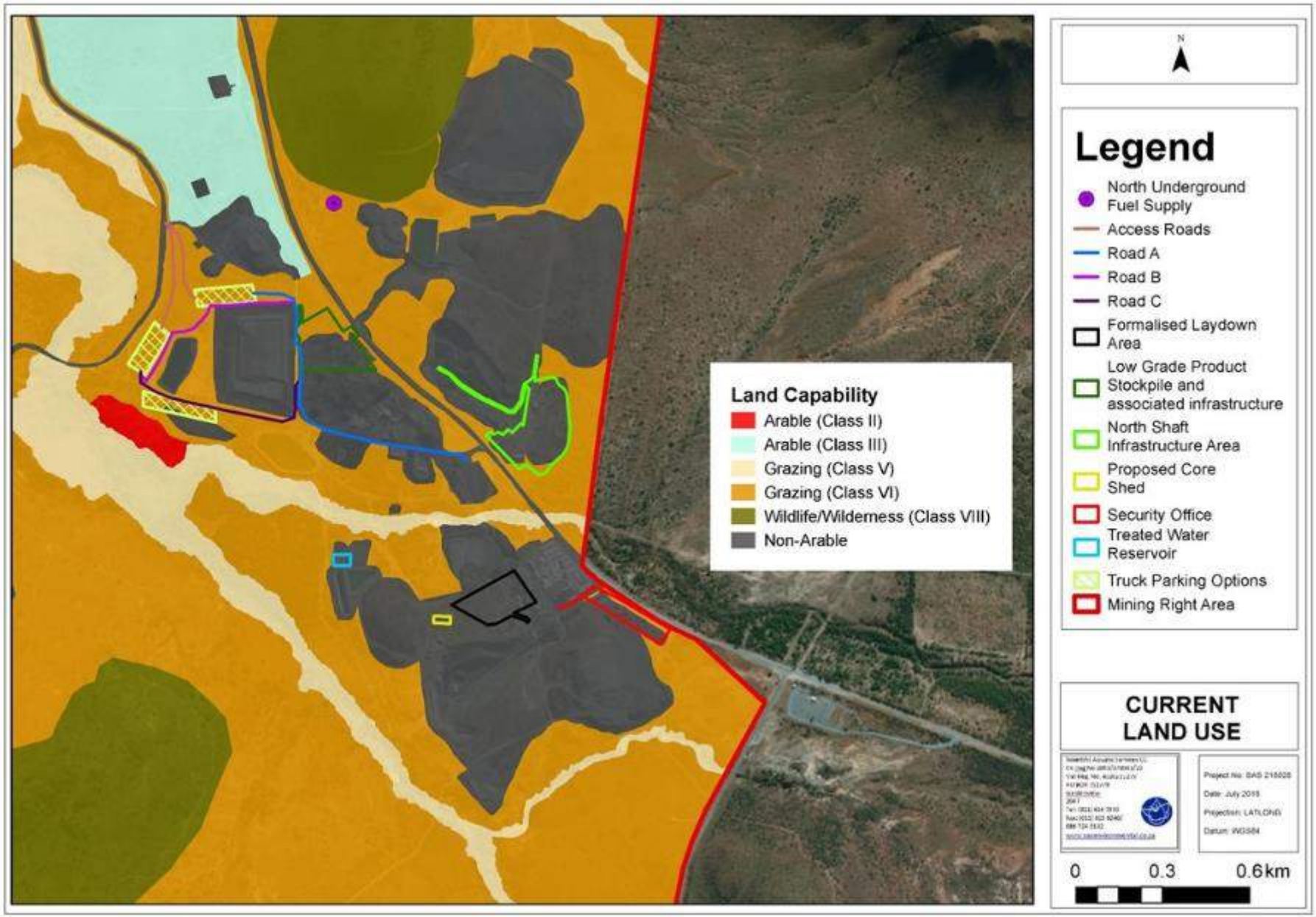


Figure 35: Map depicting land capability classes of soils associated with the infrastructure development projects within the area

Table 21: Land Capability classes for soil forms identified within the area

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent	Key notes
Hutton	Arable (Class II)	3.16	0.09	The identified Hutton soil forms are considered prime agricultural soils of high (Class II) land capability, suitable to arable agricultural land use. Therefore, these soils are considered to contribute significantly to provincial and/or national agricultural productivity if used for crop cultivation, and are essentially also well-suited for other less intensive land uses such as grazing, forestry, etc. However, emphasis is directed to their agricultural crop productivity due to the scarcity of such soil resources on a national scale and food security concerns. There are no limitations to this soil form, these soils have a moderate depth of up to 60cm to support some cultivated crops and good drainage characteristics. These soils are suitable for crop cultivation. Although considered to be suitable for cultivated agriculture, the viability of crop cultivation of these soils in this area is low due to land fragmentation by current mining and associated activities in the surrounding areas. These soils also cover a small area within the Dwarsrivier Mine which makes it insufficient for commercial agricultural production. None of the activities will impact on this soil form as planned, therefore the areas must be strictly demarcated to ensure that activities do not encroach these soils.
Bonheim	Arable (Class III)	51.80	1.46	The identified Bonheim soil forms are considered somewhat suitable for cultivation (Class III). Therefore, these soils are considered to contribute to provincial and/or national agricultural productivity if managed properly, and are essentially also well-suited for other less intensive land uses such as grazing, forestry, etc. However, emphasis is directed to their agricultural crop productivity due to the scarcity of such soil resources on a national scale and food security concerns. These soils were found to be somewhat deep, however the clay content increases in the subsoil, thus limiting rooting growth for most crops, and an effective rooting depth of 40 cm is present before reaching the layer comprised of clayey material. These soils are regarded as suitable for the cultivation of selected crops, however the viability of agricultural crop cultivation of these soils is low due to land fragmentation by current mining and associated activities in the surrounding areas. In addition, these soils also cover a small area which is not sufficient for commercial agricultural production. Only a small number of drill sites are planned in these soils areas. It is important that activities are strictly demarcated to ensure that activities do not encroach these soils in excess of what is planned.
Acardia	Grazing (Class V)	126.54	3.58	The identified Arcadia soil form is considered to be of poor (Class V) land capability, which is generally not considered suitable to arable agricultural land use. The inherently high natural fertility of these soils is however considered to be of significant value for grazing purposes. Traditionally these soils are ploughed for subsistence farming for shallow rooted arable crops like vegetables under resource-poor circumstances. Due to the limiting factors such as high clay content within these soils which tightly holds soil water such that it is not readily available for plant uptake and thus require intensive management practices. While these soils are not considered prime agricultural production soils, these soils are under cultivation for commercial farming thus making a contribution to the local, regional and national grid. Vertic soils inherently have some serious management constraints attributed to excessive stickiness when wet and hardening when dry due to high smectitic (expandable) clay minerals and high plasticity index values. The susceptibility of these soils to shrink under dry conditions and expand under moist conditions should also be considered and avoided where possible as this may cause undesired damage on the structural integrity of the surface infrastructure. Furthermore, these soils are highly sensitive to long-term stockpiling and their structural integrity is anticipated to deteriorate during stockpiling while awaiting rehabilitation. Furthermore, while these soils are not considered prime agricultural production soils, these soils were previously (pre-mining) under cultivation for commercial agricultural production. No permanent activities are planned in these areas. The mine will further also not impact on any agricultural production land. It should be noted that no long term stockpiling of soils will take place in the areas where drilling take place and ongoing rehabilitation will be undertaken.
Rensburg	Water Course (Class VI)	198.45	5.61	The Rensburg soil forms were classified as having a Class VI land capability due to land use limitations related to prolonged waterlogging attributed to inherently poor internal drainage of the underlying G horizon. The prolonged waterlogging of these soils limits their land use largely to wilderness and habitats for various plant species that are inherently tolerant and/or obligate to anoxic conditions. These soils are therefore not considered to contribute significantly to provincial and/or national agricultural productivity.

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent	Key notes
				Plant root development and water infiltration are largely impeded by the clayey, slowly permeable G horizon occurring at shallow depths of less than 50cm. Prolonged saturation of these soils typically induce anoxic (oxygen deficient) conditions which hamper root development of most arable crops. Although not considered to be of significant agricultural productivity, these soils are however considered to be of significant ecological conservation importance as they are characteristically unique to wetland habitats; and as such the recommendations and management measures of the wetland assessment report conducted as part of the environmental assessment and authorisation process take precedence. It is highly likely that these soils will be affected by the proposed activities if the 1:100 year buffers are not maintained. For this reason the project has committed to exclude the 1:100 year floodlines from the drilling programme.
Alluvial Soils	Water Course (Class VI)	198.45	5.61	These soils were classified as having a Class VI land capability due to land use limitations related to their occurrence within watercourses. These soils are therefore not considered to contribute significantly to provincial and/or national agricultural productivity. These soils are not ideal for cultivation due to their occurrence within watercourses. Thus, the occurrence of these soils within watercourses, as well as lack of structure and nutrients disqualifies these soils from commercial agriculture. Although not considered to be of significant agricultural productivity, these soils are however considered to be of significant ecological freshwater habitats, and as such the recommendations and management measures of the wetland assessment report conducted as part of the environmental assessment and authorisation process take precedence.
Brandvlei/Etosha/Gamoep	Grazing (Class VI)	247.39	6.99	These soil forms are of limited land capability and are not considered to be prime agricultural soils. These soils, at best, are suited for grazing, and the high erosion hazard of the area disqualifies these soils for being suitable for commercial farming. These soils were found to be highly weathered and have a high erosion hazard, particularly the topsoil layer. These soils harden when dry and thus limit root penetration. Where the current layout of the proposed drilling activities encroaches on these soils, strict erosion control measures should be implemented during all phases and rehabilitation would be a requirement for these soils as they can be of significant use for potential grazing and/or for supporting wildlife. These sites can at least partially be rehabilitated to ensure the soils and landscape setting is restored to a natural condition to allow for natural land uses to continue.
Glenrosa/Mayo/Mispah	Grazing (Class VII)	1217.40	34.41	The identified Glenrosa/Mayo/Mispah soil forms are considered to be of poor (Class VII) land capability and are not suitable for arable agricultural land use. Theses soils are, at best, suitable for natural pastures for light grazing. Therefore, these soils are considered to make a substantial contribution to extensive subsistence farming on a local scale. Shallow effective rooting depth is the primary limitation of the land capability of the Glenrosa/Mispah soil forms, which is due to the occurrence of a rocky layer at relatively shallow depth, which would hinder penetration of plant roots. The identified soil forms are, at best, suited for grazing and/or wilderness practices. This is due to the relatively shallow parent rock and lithocutanic material. The impact of the proposed activities on the land capability of these soils is anticipated to be low after mitigation. As much as these soils are not considered as prime agricultural soils, these soils are important for potential grazing opportunities. Therefore, implementation of rehabilitation and the proposed integrated mitigation measures is recommended to reinstate the natural topography of the area post-closure.
Mispah/Outcrop	Wildlife/Wilderness (Class VIII)	1308.9	37.00	The identified Mispah/Outcrop soil forms are considered to be of poor (Class VIII) land capability and are not suitable for arable agricultural land use. Theses soils are, at best, suitable for natural pastures for light grazing. Therefore, these soils are not considered to make a substantial contribution to extensive subsistence farming on a local scale. Shallow effective rooting depth is the primary limitation of the land capability of the Mispah/Outcrop soil forms, which is due to the occurrence of a rocky layer at relatively shallow depth, which would hinder penetration of plant roots.

Soil Form	Land Capability	Total Area (Ha)	% Areal Extent	Key notes
				The identified soil forms are, at best, suited for grazing and/or wilderness practices. This is due to the relatively shallow parent rock and lithocutanic material. The impact of the proposed activities on the land capability of these soils is anticipated to be low after mitigation. As much as these soils are not considered as prime agricultural soils, these soils are important for potential grazing opportunities. Therefore, implementation of rehabilitation and the proposed integrated mitigation measures is recommended to reinstate the natural topography of the area post-closure.
Witbank (anthrosols)	Wildlife/Wilderness (Class VIII)	286.33	8.09	The identified Witbank soils have very poor (Class VIII) land capability attributed to existing mining activities and related land uses in these areas. In addition, some of these soils have been subjected to long term compaction and erosion. This land capability class also includes area where the original soil has been buried and/or extensively modified by anthropogenic activities. These soils are therefore not considered to make any contribution to agricultural productivity even on a local scale. Comprises of significantly disturbed areas due from anthropogenic activities to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils are characterised by various limitations, primarily the absence of soil as a growth medium The current state of these soils requires significant rehabilitation in its current state. These areas can be rehabilitated holistically at mine closure.
Total Area Investigated	**3537.6**		**100**	

**Values rounded off to two (2) decimal places*

From a land capability point of view, the area presents relatively small areas of arable soils with a moderate potential for agriculture, comprising just 1.55 % of the total area, whilst the remainder of the area comprise very shallow soils not considered suitable for agricultural production.

The extent of Hutton and Bonheim soils (generally considered as Land Capability Classes II and III respectively), cannot be considered sufficient for viable cultivated small commercial farming, however placement of infrastructure on these soil forms should be avoided where feasible to minimise the loss of soil resources for potential future agricultural production.

Commercial farming of livestock is not considered ideal for this area due to the veld being classified as having a low grazing capacity of 6ha Per Large Animal Unit (PLAU). Furthermore, a significant portion of the proposed activities, notably the areas earmarked for exploration activities, is located on moderately steep terrain (medium gradient), further disqualifying this area for livestock commercial farming.

Potential arable soils (Bonheim) will be slightly impacted by the proposed drilling and exploration activities since the current drilling layout intrudes on these soils. From a soil and land capability point of view, this project is not regarded as being fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be strongly considered and implemented accordingly in an effort to conserve soil resources.

Note that with the exclusion of the 1:100 year flood lines, the Alluvial, Rensburg and Arcadia soils will now be mostly excluded. None of the Capital Projects will impact on Class II and III soils. Where the exploration activities impact on soils such as the Bonheim, these will be limited to a few exploration sites within the Mining Rights Area. No impact will take place on the Hutton soil forms.

1.g.iv.1.d.3 Topsoil Balance

A topsoil balance study was conducted by GCS (Pty) Ltd during 2016. The locations of topsoil stockpiles and the current surface infrastructure at the mine can be seen in Figure 36. 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 with this volume being 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 22: 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.

1.g.iv.1.e Ecological Footprint

1.g.iv.1.e.1 General background

The ecological study was undertaken by SAS (refer to Annexure 6 for the detailed report).

The project area is located in the Savanna Biome, within the Central Bushveld Bioregion (please refer to Figure 37 and Figure 38 for the high level habitat units of the area) and is also situated within the Sekhukhuneland Centre of Floral Endemism. The Dwarsrivier Mine Mining Right Area is located within an area that is not currently protected. The project area is however located within the Sekhukhune Mountainlands threatened ecosystem, which is indicated as Endangered (Figure 39), although the vegetation type, Sekhukhune Mountain Bushveld (Mucina & Rutherford, 2006) is considered a Least Threatened vegetation type.

Broadly, the vegetation and landscape features associated with Dwarsrivier Mine are considered to comprise 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 within the region is often associated with

ultramafic soils on southern aspects, with bushveld vegetation on these soils typically containing a high diversity of edaphic specialists, while Bushveld vegetation on mountain slopes tend to be generally taller than in the valleys, with a well-developed herb layer. Bushveld within valleys and located on dry northern aspects usually form dense 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 foot slopes of clays rich in heavy metals.

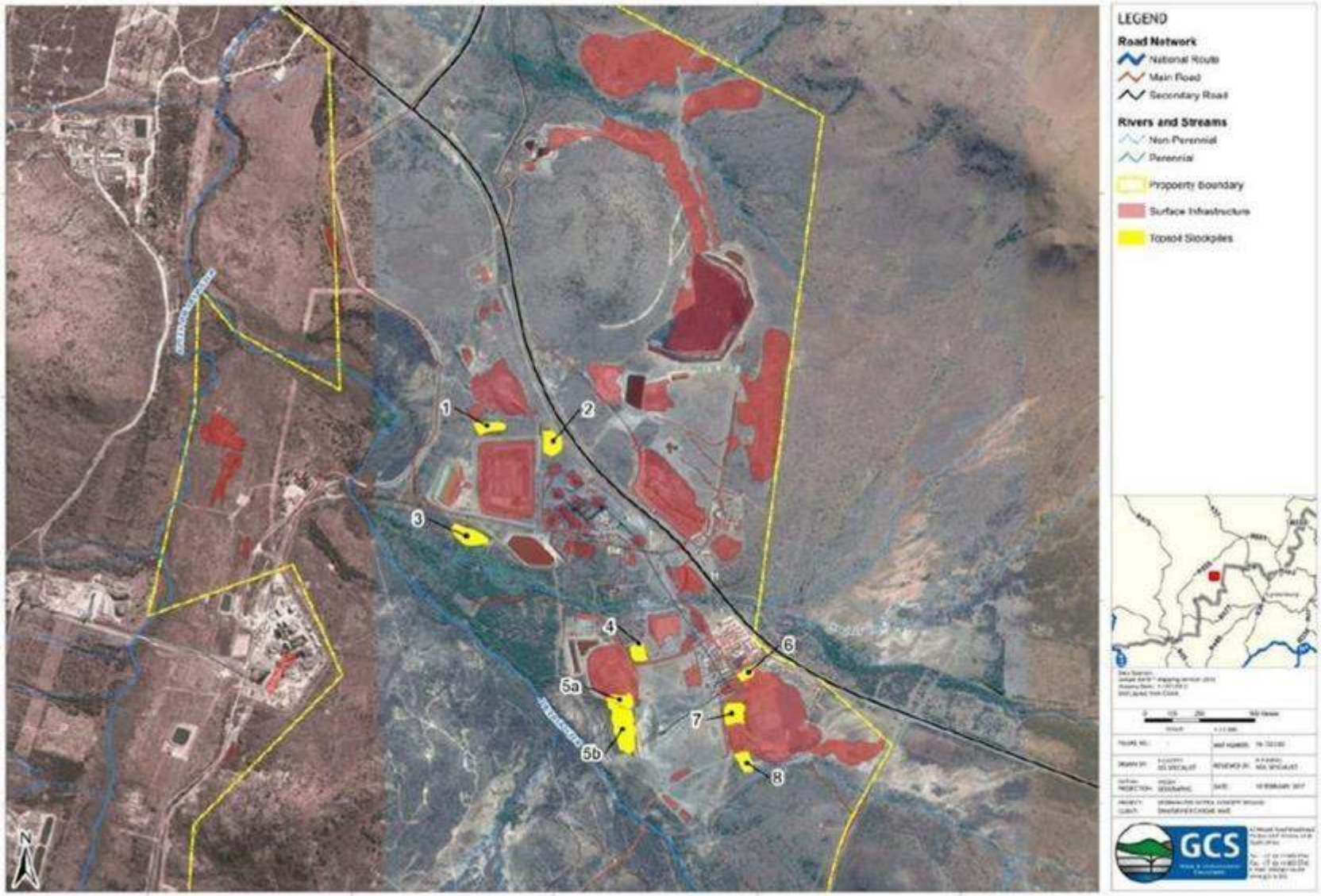


Figure 36: Topsoil Stockpile Locations

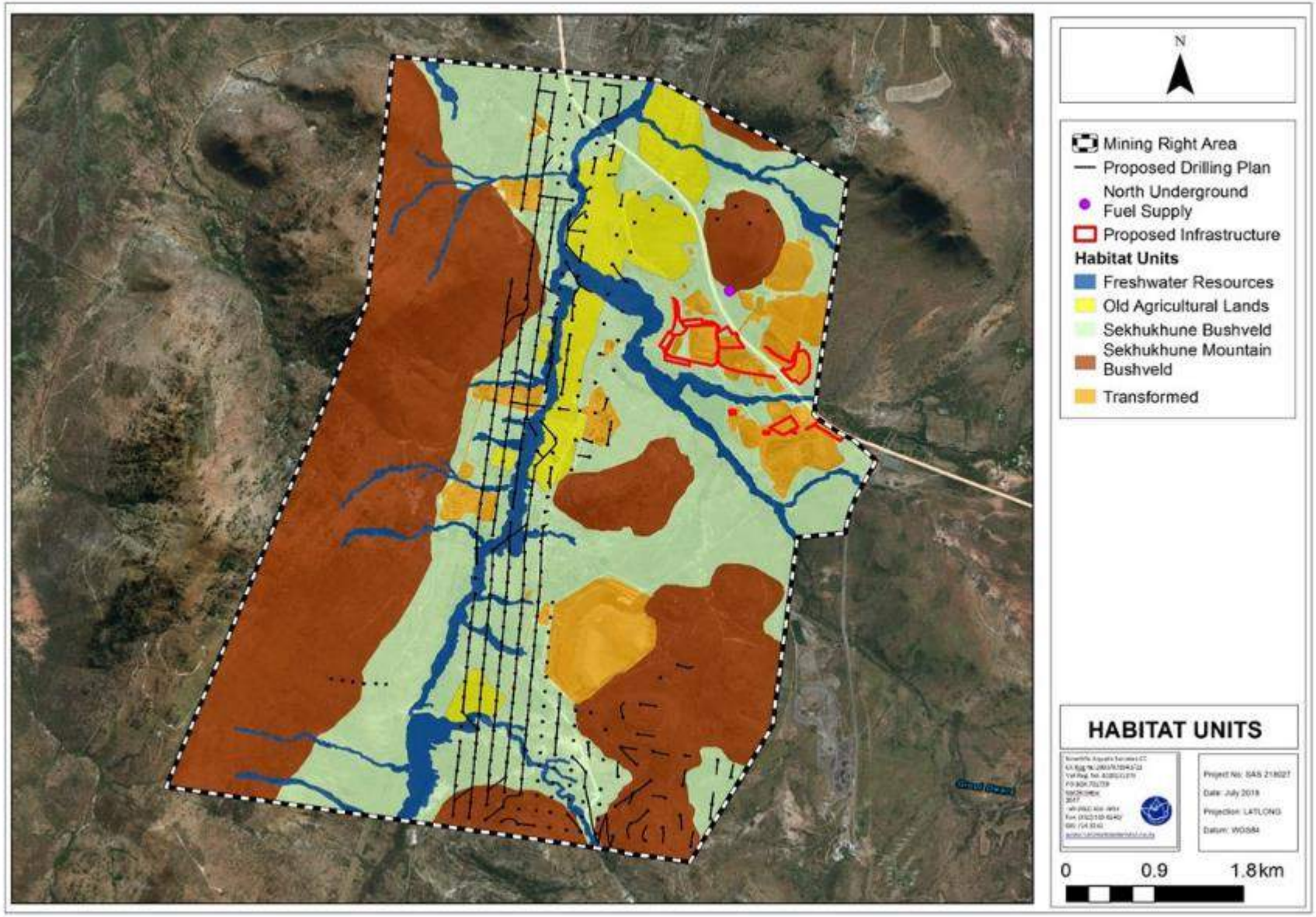


Figure 37: Illustrative representation of high level habitat units associated with the Dwarsrivier Mine

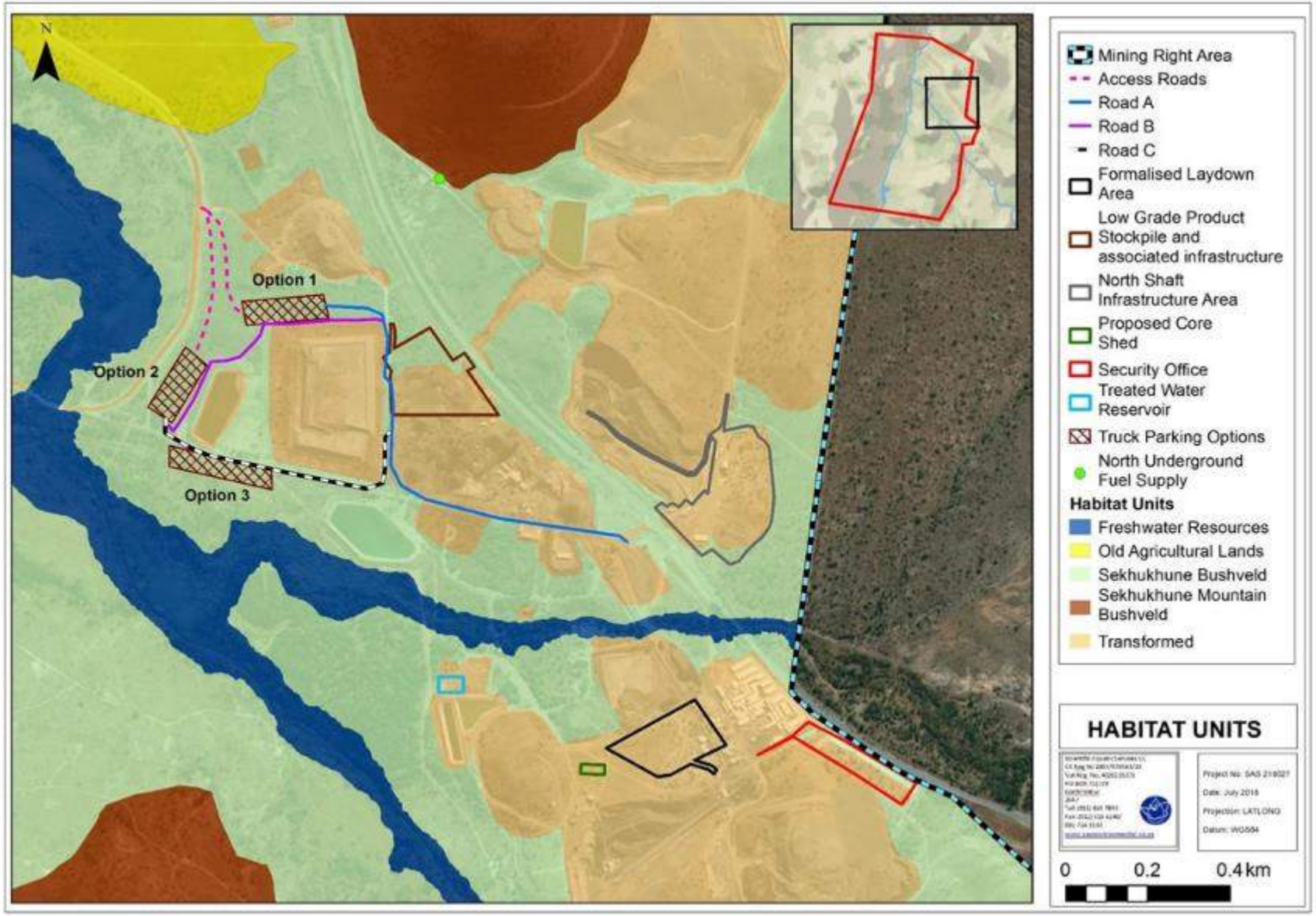


Figure 38: Illustrative representation of high level habitat units associated with the Capital Projects footprint areas

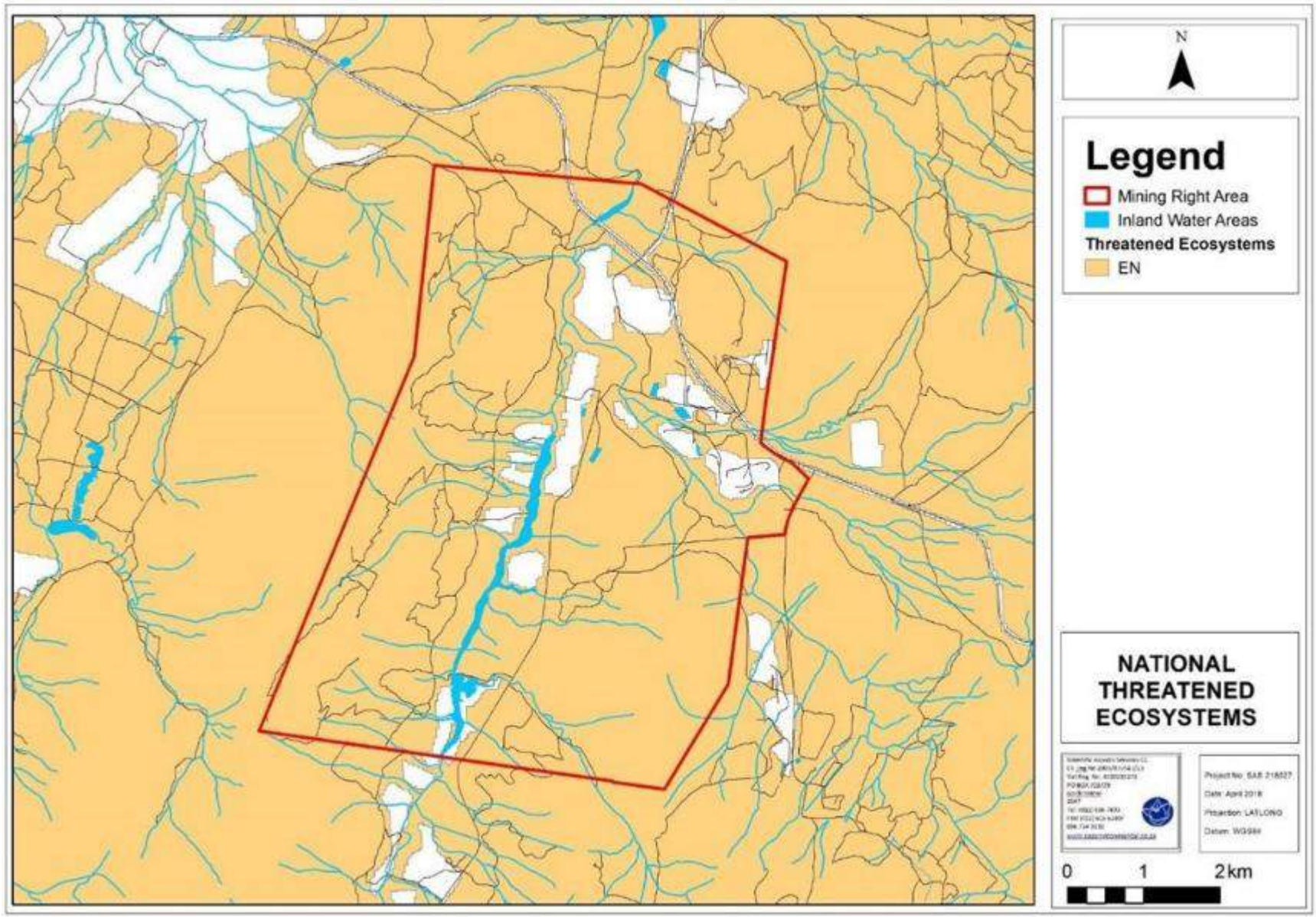


Figure 39: Endangered Sekhukhune Mountainlands Ecosystem associated with the Dwarsrivier Mine Mining Right Area (National Threatened Ecosystems, 2011)

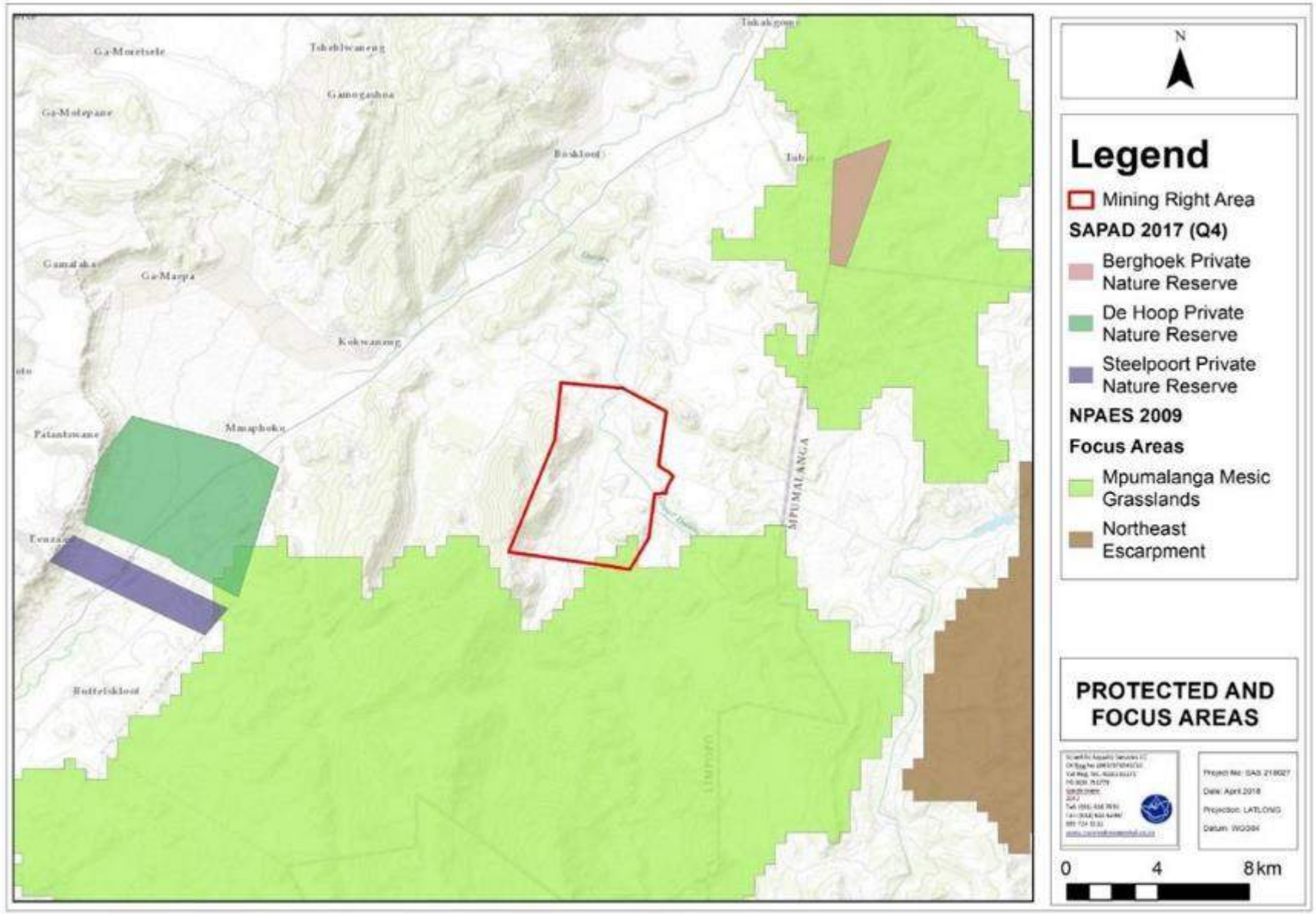


Figure 40: NPAES Focus Areas associated with the Dwarsrivier Mine Mining Right Area, as well as Protected Areas in close proximity (SAPAD, 2017 and NPAES, 2009)

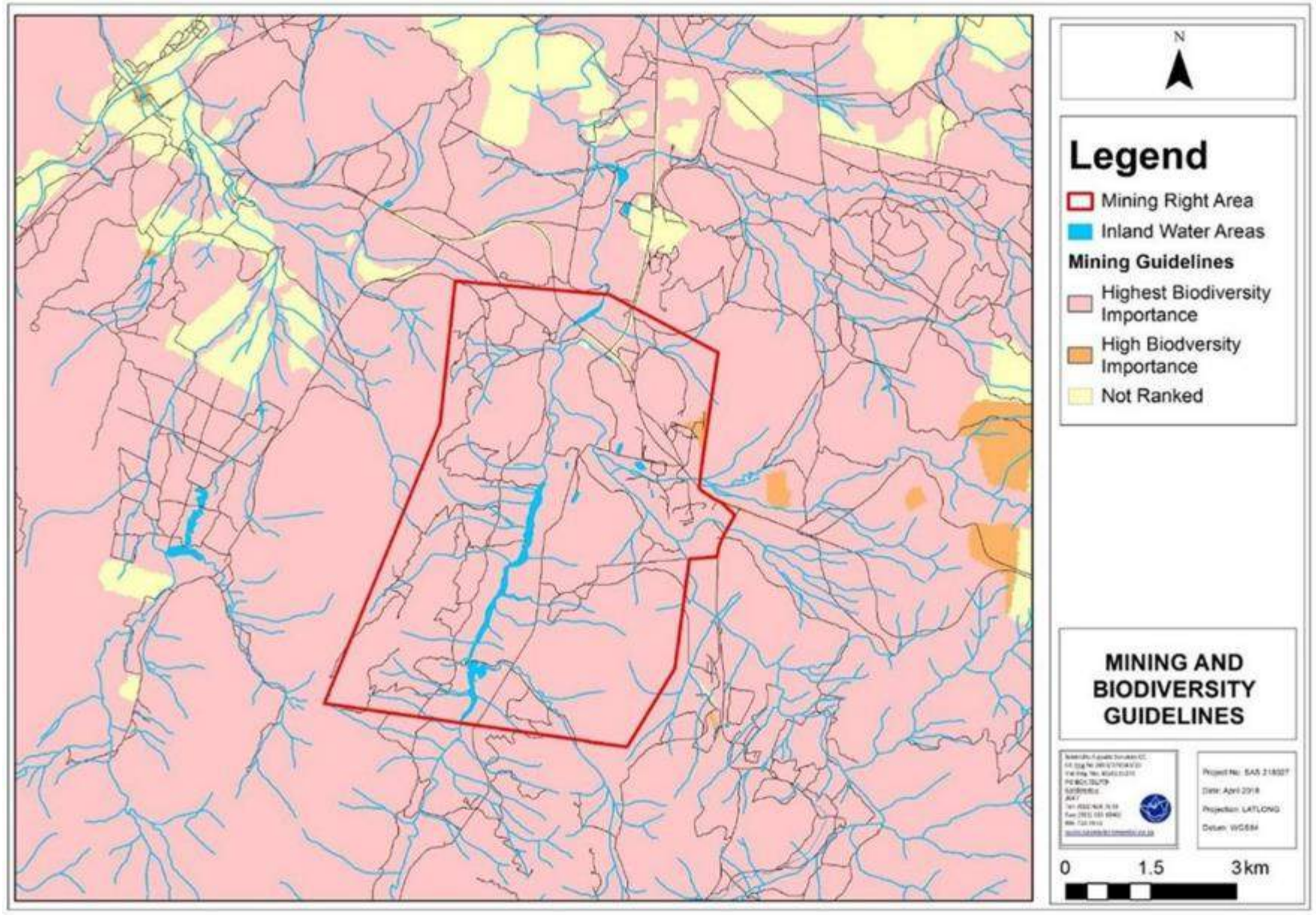


Figure 41: Importance of the area according to the Mining and Biodiversity Guidelines (2013)

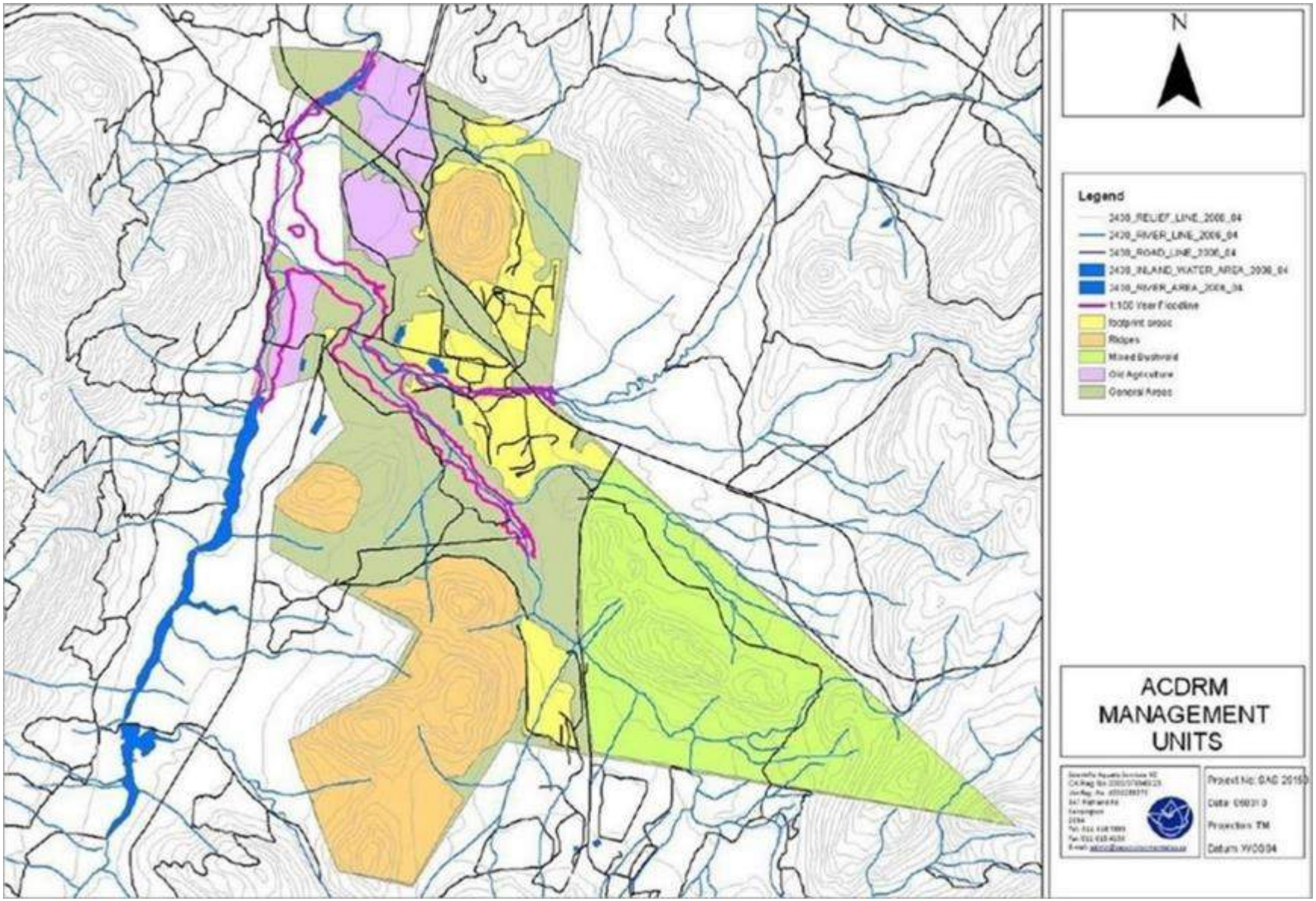


Figure 42: Management Units in terms of the Dwarsrivier Mine surface rights

According to the South African Protected Area Database (SAPAD, 2017) the mine is located approximately 9.7km east of the De Hoop Private Nature Reserve (PNR), approximately 9km southwest of the Berghoek PNR, and 11.6km of the Steelpoort PNR (Figure 40). The National Protected Areas Expansion Strategy (NPAES, 2009) database does not indicate any formally or informally protected areas to be situated within 10 km of the Mining Right Area, however it does indicate the Mpumalanga Mesic Grasslands Focus Area to be situated within the southeastern corner of the Mining Right Area (Figure 40).

In terms of the Mining and Biodiversity Guidelines (2013), it should be noted that the majority of the Mining Right Area, with the exception of a small area within the northern portion falls within an area considered to be of Highest Biodiversity Importance (Figure 41). Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk, that due to the potential biodiversity significance and importance of these areas to ecosystem services (e.g. water flow regulation and water provisioning), that mining projects will be significantly constrained or may not receive necessary authorisations.

The majority of the area, with the exception of two small area in the eastern portion of the Mining Right Area falls within a Critical Biodiversity Area (CBA 1) (Figure 57). These are Irreplaceable areas, which are required to meet biodiversity pattern and/or ecological processes targets; and with no alternative sites available to meet targets. Two small portions within the eastern portion of the Mining Right Area is considered to be Ecological Support Areas (ESA 2). These are areas where no natural habitat remains, but that are still important for meeting ecological processes. Please refer to 1.g.iv.1.i for more details in this regard.

1.g.iv.1.e.2 Habitat Units

Five habitat units have been identified (please refer to Figure 37 and Figure 38):

- Sekhukhune Mountain Bushveld;
- Sekhukhune Bushveld;
- Freshwater Habitat Unit;
- Old Agricultural Lands; and
- Transformed Habitat.

1.g.iv.1.e.2.1 Habitat Unit 1

Habitat Unit 1 covers the Sekhukhune Mountain Bushveld habitat and is considered to have a high floral habitat sensitivity. This habitat unit is the second largest habitat unit present within the Mining Right Area and will be mostly affected by the proposed drill pads and exploration activities, including temporary access roads. The majority of the Sekhukhune Mountain Bushveld habitat unit present within the Mining Right Area is still in pristine condition and is classified as having a Highest Biodiversity Importance (Mining and Biodiversity Guidelines, 2013) and falling within a CBA 1 (Limpopo CPLan V2, 2013).

Four floral SCC, namely *Sclerocarya birrea* subsp. *caffra* and *Lydenburgia cassinoides* which are protected under the National Forests Act (Act 84 of 1998), *Aloe castanea* and *Aloe marlothii* protected under Limpopo Environmental Management Act (LEMA) (Act 7 of 2003), were the only floral Species of Conservation Concern (SCC) observed within the Sekhukhune Mountain Bushveld Habitat Unit during the field assessment. Protected trees occur throughout the Mining Right Area and area earmarked for exploration activities and drilling pads in moderate/ high numbers and before any construction or drilling activities can occur, a detailed walk down of the area must take place to mark all protected tree species. Permits from the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) and Department of Agriculture, Forestry and Fisheries (DAFF) should be obtained to remove, cut or destroy these *Aloe* sp and tree species respectively before any proposed activities may take place. *Vitex obovata* subsp. *wilmsii* was observed within the habitat unit and it is considered an important food resource for *Pycna sylvia* (Cicada).

Floral diversity is considered to be high. The woody component within the habitat unit is dominated by species such as *Euclea crispa* subsp. *crispa, Searsia leptodictya, Combretum apiculatum* subsp. *apiculatum, Combretum molle* and *Dichrostachys cinerea*. For a comprehensive species list refer to Annexure 6, which contains the Ecological Report (refer to Appendix D of said report).

A moderate diversity of alien and invasive plant species such as *Bidens pilosa* and *Tagetes minuta* are present, but their abundance is low, and as such the habitat integrity of this habitat unit is considered largely intact.

This habitat unit is considered a relatively unique landscape that supports an abundance of floral species, a high floral diversity and is suitable habitat for several floral SCC as identified during the field assessment and previous studies undertaken within the Mining Right Area.

1.g.iv.1.e.2.2 Habitat Unit 2

Habitat Unit 2 covers the Sekhukhune Bushveld habitat and is considered to have a moderately high floral habitat sensitivity.

Three floral SCC, namely *Sclerocarya birrea* subsp. *caffra* and *Lydenburgia cassinoides* which are protected under the National Forests Act (Act 84 of 1998) and *Aloe marlothii,* which is protected under the LEMA (Act 7 of 2003) were the only floral SCC observed within the Sekhukhune Bushveld Habitat Unit during the field assessment. Protected trees occur throughout the habitat unit in moderate/ high numbers and before construction or drilling takes place a detailed walk down of the area must take place to mark all protected tree species. Permits from LDEDET and DAFF should be obtained to remove, cut or destroy protected Aloe and tree species respectively before any proposed activities may take place. *Vitex obovata* subsp. *wilmsii* was observed within the habitat unit and it is considered an important food resource for *Pycna sylvia*, a cicada species previously believed to be extinct and rediscovered in 2001.

Floral diversity is considered high. The woody component within the habitat unit is dominated by species such as *Combretum apiculatum, Ziziphus mucronata, Searsia leptodictya, Peltophorum africanum* and *Dombeya rotundifolia*. For a comprehensive species list refer to Annexure 6, which contains the Ecological Report (refer to Appendix D of said report).

The Sekhukhune Bushveld habitat unit is the largest habitat unit present in the Mining Right Area and the majority of the proposed drilling sites are present within this habitat unit. The majority of the habitat unit present within the Mining Right Area is still in pristine condition and is classified as having a Highest Biodiversity Importance (Mining and Biodiversity Guidelines, 2013) and is classified as a CBA 1 (Limpopo CPLan V2, 2013). Sekhukhune Bushveld habitat adjacent to the proposed Capital Project area has been affected by edge effects of current mining activities and is not representative of pristine habitat. The Sekhukhune Bushveld habitat present within close proximity of the proposed drill pads are in a more pristine state, as fewer edge effects from mining activities have taken place in these areas and the habitat is considered to be representative of the expected Sehkukhune Mountain Bushveld vegetation type.

A moderate diversity of alien and invasive plant species such as *Opuntia ficus-indica, Zinnia peruviana, Melia azedarach* and *Tagetes minuta* is present, but their abundance is low, and as such the habitat integrity of this habitat unit is considered largely intact. Areas of significant bush encroachment by *Dichrostachys cinerea* and large areas of erosion were observed; this is an indication of overgrazing cause by cattle grazing.

This habitat unit is considered a relatively unique landscape that supports a high floral species diversity and provides suitable habitat for several floral SCC as identified during the field assessment and previous studies undertaken within the Mining Right Area.

1.g.iv.1.e.2.3 Habitat Unit 3

Habitat Unit 3 includes the Freshwater Habitat and is considered to have a moderately high floral habitat sensitivity.

One floral SCC, namely *Lydenburgia cassinoides* was encountered in this habitat unit. *Ledebouria megaphylla* (previously known as *Resnova megalphylla* was not observed during the field assessment, but was recorded during previous assessments as is known to be present within the Freshwater habitat unit. This species is not listed in terms of the National Red List, but is deemed important due to it being restricted to the Sekhukhuneland centre of floristic endemism*Vitex obovata* subsp. *wilmsii* was observed within the habitat unit and it is considered an important food resource for *Pycna sylvia* (Cicada).

Floral diversity is considered to be high. For a comprehensive species list refer to Annexure 6, which contains the Ecological Report (refer to Appendix D of said report).

The Freshwater habitat unit is present throughout the area earmarked for exploration activities as part of the resource and reserve drilling project. The majority of the focus area is still in a natural condition and is classified as having a Highest Biodiversity Importance (Mining and Biodiversity Guidelines, 2013) and located within a CBA 1 (Limpopo CPLan V2, 2013). Furthermore, any activities that are planned within the freshwater habitat or the relevant buffers will need authorisation from the DWS. Given the above the Freshwater habitat unit is considered of high sensitivity.

Habitat is mostly intact, except where current mining activities and associated edge effects have affected habitat integrity, noted by the presence of *Arundo donax* and *Populus x canescens*. However, interconnected nature of the Klein Dwarsrivier, Groot Dwarsrivier and ephemeral drainage lines ensure that habitat connectivity is maintained throughout this habitat unit.

The freshwater habitat unit contributes significantly to floral diversity through the creation of niche habitat for flora adapted to saturated soil conditions.

1.g.iv.1.e.2.4 Habitat Unit 4

Habitat Unit 4 covers the Old Agricultural Lands and is considered as a moderately low floral habitat sensitivity.

Only one floral SCC, namely *Sclerocarya birrea* subsp. *caffra,* which is protected under the National Forests Act (Act 84 of 1998) was encountered within the habitat unit. Protected trees occur throughout the habitat unit in moderate numbers and before construction takes place a detailed walk down of the area must take place to mark all protected tree species.

Floral diversity was moderately low and dominated by floral species that are indicators of disturbed veld such as *Melinis repens*, *Bothriochloa radicans, Hyparrhenia hirta* and *Dichrostachys cinerea*. The herbaceous layer was noted to be very homogenous, being dominated by pioneer and unpalatable grass species.

No vegetation representative of the vegetation type remains, and the habitat unit is dominated by pioneer species including woody encroaching floral species, such as *Dichrostachys cinerea*.

Habitat is transformed and dominated by species that are indicative of disturbed areas with alien species such as *Bidens pilosa* and *Tagetes minuta* being present. Through the cessation of agricultural activities, these areas have begun to regress back to their natural states, but the herbaceous layer is still homogenous and dominated by pioneer floral species.

No unique landscapes important to flora were present. The Old Agricultural fields are present along the length of the Klein Dwars, Groot Dwars and Dwars River and provides corridors of movement and vital linkages between the various habitats for faunal species.

1.g.iv.1.e.2.5 Habitat Unit 5

Habitat Unit 5 covers the Transformed Habitat Unit and is considered as a low floral habitat sensitivity.

No floral SCC were encountered in this habitat unit and it is highly unlikely that any such species will occur within these area. Floral diversity was moderately low and dominated by floral species that are indicators of disturbed veld such as *Melinis repens*, *Aristida congesta* subsp*. congesta* and *Dichrostachys cinerea*.

No vegetation representative of the expected vegetation type remains, and the habitat unit is dominated by pioneer species and alien and invasive plant species. Habitat is transformed and dominated by species that are indicative of disturbance.

No unique landscapes important in terms of floral conservation are present.

1.g.iv.1.e.3 Floral Species of Concern

The following protected species listed under the National Forests Act (Act 84 of 1998) (NFA) were observed within the area earmarked for drilling activities at the time of the assessment:

- *Sclerocarya birrea subsp. caffra;* and
- *Lydenburgia cassinoides.*

Lydenburgia cassinoides is also listed as Neat Threatened in terms of the National Red List. Note that the *Balanites maughamii* is also protected under the NFA.

In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DAFF a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including field assessments) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines.

Additionally, two species listed as protected under the LEMA (Act 7 of 2003) were observed during the field assessment namely:

- *Aloe marlothii;* and
- *Aloe castanea.*

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 LDEDET.

The following additional floral SCC were recorded during previous studies (BEC, 2013) (Ecorex, 2008) undertaken in the area and have a high probability to be present within the Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units as preferred habitat for these floral SCC are present:

- *Boophone disticha* (Declining Status, Poisonous, medicinal uses);
- *Boscia foetida* (Medicinal uses, LEMA - Schedule 12: Protected Plants)*;*
- *Chlorophytum* cf. *cyperaceum* (LEMA - Schedule 12: Protected Plants)*;*
- *Elephantorrhiza praetermissa* (LEMA - Schedule 12: Protected Plants)*;*
- *Euphorbia* species (LEMA - Schedule 12: Protected Plants)*;*
- *Gladiolus* species (LEMA - Schedule 12: Protected Plants)*;*
- *Ledebouria (Resnova)* sp.aff. *megaphylla;* and
- *Zantedeschia pentlandii* (Listed as Vulnerable in terms of the National Red List).

1.g.iv.1.e.4 Alien and Invasive Plant Species

During the floral assessment, dominant alien and invasive floral species were identified and are listed in the table below.

Table 23: Dominant alien vegetation species identified during the field assessment.

Species	English name	NEMBA Category	CARA Category
Succulents			
Agave sisalana	Sisal	2	2
Cereus jamacara	Queen of The Night	1b	1
Opuntia ficus-indica	Prickly Pear	1b	1
Trees/ shrubs			
Leucaena leucocephala	Leacaena	2	1
Melia azedarach	Syringa	1b	3
Populus x canescens	Grey Poplar	2	2
Tecoma stans	Yellow Bells	1b	1
Jacaranda mimosifolia	Jacaranda	1b	3
Senna didymobotrya	Peanut butter Cassia	1b	3
Grasses			
Arundo donax	Spanish Reed	1b	1
Pennisetum setaceum	Fountain Grass	1b	1
Forbs			
Argemone ochroleuca	White-flowered Mexican Poppy	1b	1
Datura ferox	Large Thorn Apple	1b	1
Datura stramonium	Common Thorn Apple	1b	1
Flaveria bidentis	Smelter's bush	1b	-
Ricinus communis	Castor-oil plant	2	2
Solanum elaeagnifolium	Silverleaf bitter apple	1b	1
Solanum sisymbriifolium	Dense-thorned Bitter Apple	1b	1
Verbena bonariensis	Wild Verbena	1b	-
Xanthium strumarium	Large Cocklebur	1b	1
Plant species not listed in NEMBA			
Alternanthera pungens	Khakiweed	-	-
Amaranthus hybridus	Pigweed	-	-
Bidens pilosa	Common Black Jack	-	-
Bougainvillea sp.	Bougainvillea	-	-
Dichrostachys cinerea	Sekelbush	-	-
Gomphocarpus fruticosus	Milk Weed	-	-
Tagetes minuta	Tall Khaki Weed	-	-
Zinnia peruviana	Redstar Zinnia	-	-

National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R864 of 2016:
Category 1a – Invasive species that require compulsory control.
Category 1b – Invasive species that require control by means of an invasive species management programme.
Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
Category 3 – Ornamentally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).

From the table above, it is clear that a high diversity of alien plant species occurs within the Dwarsrivier Mine. The majority alien and invasive plant species was observed within disturbed areas, with special mention of existing mining infrastructure areas. Alien floral species located in the vicinity of the proposed project activities must be removed on a regular basis as part of maintenance activities according to the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations (GN R864 of 2016).

1.g.iv.1.e.5 Medicinal Floral Species

Medicinal plant species are not necessarily indigenous species, with many of them regarded as alien or invasive weeds. The table below presents a list of dominant plant species with traditional medicinal value, plant parts traditionally used and their main applications, which were identified during the field assessment. These medicinal species are all commonly occurring species and are not confined to the focus area.

Table 24: Dominant traditional medicinal floral species identified during the field assessment. Medicinal applications and application methods are also presented (van Wyk, Oudtshoorn & Gericke, 2009).

Species	Name	Plant parts used	Medicinal uses
Agave americana	Sisal	Sap	Sap can be taken internally in the treatment of diarrhoea & dysentery. The sap is antiseptic, diaphoretic, diuretic and a laxative. The plant itself is used in the treatment of indigestion, flatulence, constipation, jaundice and dysentery.
Aloe marlothii	Mountain aloe	Sap	Healing of sores.
Balanites maughamii	Torchwood	Stem bar, root bark	Used in ritual emetics. Bark is applied in the form of cutaneous implantations to strengthen the body. Fruits are lethal to freshwater snails and other organisms.
Lydenburgia cassinoides	Sekhukhune Bushman's Tea	Leaves, Bark	Various parts taken medicinally. General remedy. Stimulating effect when leaves are chewed, or extract ingested as tea.
Carissa bispinosa	Common Num - Num	Fruit	Edible fruit and the berries are also used to make jams and jellies. Roots to treat toothache.
Dichrostachys cinerea	Sickle Bush	Roots, bark, leaves and fruit	Pods are very nutritious and eaten by game and stock. The wood is hard and durable, used as fencing posts. Roots, bark, leaves and fruit used in traditional medicine.
Euclea crispa	Blue Guarri	Roots	Ripe berries are edible. Root infusions are used to treat epilepsy, stomach disorders, rheumatism, coughs and diabetes.
Grewia flava	Velvet Raisin Bush	Bark & fruit	The bark is used for making baskets, and an intoxicating drink is made from the fruit. Porridge is made from dried fruit
Kirkia wilmsii	Mountain Seringa	Roots	Thickened roots contain water that is used by humans during droughts. Used for goat fodder.
Sanseviera hyacinthoides	Mother - in - law's - tongue		Used traditionally to treat earache, toothache, intestinal worms, haemorrhoids and as a protective charm.
Schotia brachypetala	Weeping Boer - bean	Bark and leaves	Bark and leaves used against heartburn, diarrhoea, hangovers and ulcers. Wood used in furniture - making
Sclerocarya birrea subsp. *caffra*	Marula	Bark	Bark widely used for medicinal purposes (proven antihistamine and anti-diarrhoea properties) and to obtain a pale brown dye. Fruit is edible, eaten fresh or made into a jelly.
Vachellia karroo	Sweet Thorn	Bark and leaves	The sweet thorn has many medicinal uses ranging from wound poultices to eye treatments and cold remedies. The bark, leaves and gum are usually used. It is also used to treat cattle which have tulp poisoning.

Species	Name	Plant parts used	Medicinal uses
Vachellia nilotica	Scented Thorn	Bark, leaves, wood	Wood used as firewood and for fencing posts. Bark exudes an edible gum and is used medicinally. Root extract is used in the treatment of tuberculosis, impotence, diarrhoea, haemorrhages, toothache, dysentery and gonorrhoea. Extracts made from the leaves are used in the treatment of menstrual problems, eye infections, sores, ulcers, indigestion and haemorrhage.
Vachellia tortilis	Umbrella Thorn	Wood, bark	Wood is used for fence posts, firewood, furniture and wagon wheels. Bark is used to make string and is also a good source of tannins.
Ziziphus mucronata	Buffalo Thorn	Bark, leaves, roots	Cough & chest problems, diarrhoea & dysentery; boils, sores & glandular swellings; pain relief

A moderately high diversity of medicinal species is present, with most of the species being common and widespread and not confined to the project areas. It is therefore unlikely that the proposed activities will pose a significant threat to medicinal species locally and regionally. If individuals or communities of these species will be disturbed by the proposed project 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 for species listed from the relevant departments listed in Section 1.g.iv.1.e.3 before.

1.g.iv.1.f Animal Life

The Faunal Assessment was undertaken by SAS and the detailed report can be assessed in Annexure 6.

The proposed Capital Projects are all located within the existing active mining area, and as such, the impacts associated with the various capital projects on faunal life are expected to be of low to medium low significance prior to the implementation of mitigation measures. With the cognisant implementation of mitigation measures, these impacts can be minimised to low and very low significance.

The section below mainly deals with the drilling and exploration project which is located within a largely natural area of increased sensitivity and is likely to impact upon several faunal SCC and niche habitats.

1.g.iv.1.f.1 Mammals

The mammal habitat sensitivity is considered Moderately-High.

Spoor and scat of *Panthera pardus* [Leopard, a Vulnerable (VU) species in terms of the Mammal Red List (2016) and also listed as a South African National Biodiversity Institute (SANBI) Threatened or Protected Species (TOPS 2015)] were observed throughout the exploration and drilling site footprint areas during the field assessment. Furthermore, *Hyaena brunnea* (Brown hyaena, Near Threatened) has been previously recorded in the Two Rivers Platinum Mine property (BEC 2013). *Aonyx capensis* (Cape Clawless Otter, Near Threatened) is also likely to occur within the Klein and Groot Dwarsrivier systems. The deep alluvial soil areas alongside the Klein Dwarsrivier furthermore may provide habitat to *Chrysospalax villosus* (Rough-haired Golden Mole, VU). This species, or possibly a subspecies thereof has recently been observed further south in the valley along the Dwars River.

Mining and edge effects has had an impact on mammal species, notably the extent and availability of habitat. Regardless of these impacts, a moderately high diversity of faunal species still remains within the project area. Although large mammal species are not as prevalent, small to medium sized mammals were prevalent throughout much of the project area. Faunal diversity hotspots include the freshwater systems and the Sekhukhune Mountain Bushveld areas.

Food availability is variable across the habitat units, with the freshwater systems and associated ecotonal areas providing the most suitable grazing material. Browsing species are able to source food material throughout all the habitat units. Predators, being size dependant, will focus their efforts on species and areas that provide the highest energy return for the lowest effort input, and as such will be active throughout the project area in search of prey.

Habitat integrity has been compromised somewhat, notably as a result of the construction of fences and road networks, creating movement barriers to mammal species. However, the remaining areas are diverse enough in habitat units and large enough to still support mammal species.

Mining activities have resulted in the localised degradation of the habitat; however, this is largely restricted to the areas immediately adjacent to existing mine infrastructure. The old agricultural lands have recovered sufficiently to contribute to the overall ecological functioning, providing habitat to a number of smaller mammal species. The Sekhukhune Mountain Bushveld and the Sekhukhune Bushveld habitat areas provide highly suitable habitat for mammal species. These habitat units are widely utilised for foraging as well as breeding, with mammal species occurring both within these areas as well as moving through them to adjacent properties. The freshwater habitat provides a much needed water resource, as well as niche habitat for mammal species such as *Aonyx capensis* (Cape Clawless Otter) which are dependent on permanent water sources for habitat.

1.g.iv.1.f.2 Avifauna

The avifaunal habitat sensitivity is considered Moderately-High.

During the site assessment no avifaunal SCC were observed, however on previous assessments in the areas *Gyps africanus* (White Backed Vulture, VU) has been seen. Although it is unlikely that this species will utilise the Mining Right Area for nesting, the area is likely to form part of this species' foraging area. *Falco biarmicus* (Lanner Falcon, VU), *Sagittarius serpentarius* (Secretary bird, VU), *Polemaetus bellicosus* (Martial Eagle, VU), *Neotis denhami* (Denham's Bustard, NT) are also expected to occur within and utilise the project area.

Avifaunal diversity is considered to be moderately high, as can be expected in the region. The various habitat units and associated ecotones are able support an abundant diversity of avifaunal species.

Food resources are readily available to avifaunal species. Many of the smaller avifaunal species are sustained through the seed and fruit production of the herbaceous layer and the woody plants. Insects, reptiles and small mammals supplement the food requirements of predatory avifaunal species.

Habitat integrity is considered moderately high. Increased bush encroachment (by *Dichrostachys cinerea* in particular), loss of habitat to mining infrastructure and alien plant proliferation along the riparian zone has resulted in a decrease in the overall habitat integrity.

The area with its varying landscapes and habitat structures is well utilised by avifaunal species. The combination of riparian, bushveld areas, mountain slopes and wooded valleys all contribute to a high level of habitat availability. The focus area provides a variety of areas for roosting, foraging and for the nesting and breeding of avifaunal species.

1.g.iv.1.f.3 Amphibians

The amphibian habitat sensitivity is considered Moderately-High.

No amphibian SCC were observed within the project area. Furthermore, no amphibian species listed as protected or of conservational concern are expected to occur within the focus area.

No amphibian species were observed at the time of the assessment, however amphibian diversity within the project area is considered to be intermediate. Although the freshwater habitat provides suitable habitat for amphibian species, the focus area is not known to harbour a high diversity of amphibian species, as evident from desktop results obtained from the South African Frog Atlas (SAFAP) and the Frog Map (Animal Demography Unit). Species previously observed within the focus area include *Breviceps adspersus* (Bushveld Rain Frog), *Schismaderma carens* (Red Toad), *Hyperolius marmoratus* (Painted Reed Frog) and *Kassina senegalensis* (Bubbling Kassina).

Amphibians rely primarily on insects as a food source. The high abundance of insects within the project area ensures that amphibian species are not stressed for food resources, notably around the freshwater habitats.

The interconnected nature of the Klein Dwars, Groot Dwars and ephemeral drainage lines ensure that habitat connectivity is maintained. This, combined with the high levels of habitat availability and relatively localised areas of disturbance ensures that the overall habitat integrity within the Mining Right Area remains high.

The freshwater areas provide primary habitat for amphibian species, whilst the riparian areas ecotonal areas are suitable for amphibian species that are less water dependant. Habitat availability is considered to be lower in the old agricultural fields and mountainous areas, due to a decreased level of food provision and a harsher environment.

1.g.iv.1.f.4 Reptiles

The reptile habitat sensitivity is considered Moderately-High.

Although no reptile SCC were observed during the site assessment, the species *Python natalensis* (African Python, VU) which is listed in the Limpopo State of the Environmetnal Report (SoER 2004 as VU) has been observed within the project area. Furthermore, the mountainous areas with sheet rock are known to be inhabited by *Platysaurus orientalis fitzsimonsi* (Fitzsimon's Flat Lizard, Near Threatened), whilst *Homoroselaps dorsalis* (Striped Harlequin Snake, Near Threatened) and *Chamaesaura aenea* (Coppery Grass Lizard, N Near Threatened) are likely to occur in the Sekhukhune Bushveld habitat.

The project area in the vicinity of the proposed exploration and drilling activities is considered to have a moderately high reptile diversity. A number of species were observed during the assessment including *Gerrhosaurus flavigularis* (Yellow-throated Plated Lizard), *Dendroaspis polylepis* (Black Mamba), *Agama aculeata distanti* (Distant's Ground Agama), *Trachylepis margaritifer (Rainbow Skink)* and *Platysaurus orientalis* (Sekukhune Flat Lizard). Mine personnel further confirmed that species such as *Python natalensis* (African Python) and *Naja mossambica* (Mozambique Spitting Cobra) have been observed previously.

Reptiles are predominantly predatory; however, it has been observed that some of the skinks will eat soft vegetation material such as flowers and fruits when available in order to supplement their food requirements. The project area earmarked for exploration and drilling, with variable plant material, small mammals, reptiles, amphibians and invertebrates present, is considered to have moderately high food resources for reptile species.

Although mining activities in the region have resulted in the loss of habitat connectivity and vegetation clearance, the remaining habitat is still considered to be of high integrity for reptile species. Fences have done little to limit the movement of reptile species, and as such the habitat connectivity for reptiles is still largely intact.

Reptile species will be dominant in the undisturbed areas to the south of the focus area as well as the habitat along the Klein Dwars and Dwars River. The mountainous areas in the south of the focus area are prime habitat areas for species such as *Agama aculeata distanti* (Distant's Ground Agama), *Trachylepis margaritifer (Rainbow Skink), Platysaurus orientalis fitzsimonsi* (Fitzsimon's Flat Lizard) and *Platysaurus orientalis* (Sekukhune Flat Lizard), where the rocky outcrops and sheet rock are used for basking as well as areas of refuge when threatened. The Sekhukhune bushveld areas and old agricultural lands are likely to be readily utilised by predatory snakes that actively hunt for their prey.

1.g.iv.1.f.5 Insects

The invertebrate habitat sensitivity is considered Moderately-High.

No invertebrate SCC were observed within the Mining Right Area, nor are any expected to occur within the project area. Although not listed as endangered or protected, the species *Pycna sylvia* is an endemic cicada species with limited distribution ranges within the Limpopo province. This species is known to occur within both the Groot and Klein Dwars valleys. Previous studies have recorded this species within the Two Rivers Platinum property. Although previously this species has been strongly associated with the tree species *Vitex obovata* subsp *wilmsii*, later studies have begun to suggest that this association is not as strong as previously expected (Ecorex 2008; R.D. Stephen Pers Com 2018). With *Pycna sylvia* being observed within areas other than *Vitex* sp. stands and on other tree species, stating that the conservation of *Vitex* sp. trees can no longer be considered a 100% mitigation measure for avoiding impacts to *Pycna sylvia*.

Insects can be either classified as generalists or specialists depending on their feeding preferences and habitat requirements. The project area in the vicinity of exploration activities caters for both groups of insects, as was evident by the high diversity of insects observed across the various habitat units. Species of the Coleoptera and Orthoptera families can often be used as examples of generalist species. The project area as expected was dominated by a high diversity of generalist insect species, however the known presence of *Pycna sylvia* has resulted in the increased sensitivity rating for insect diversity.

Extensive vegetated areas of varying plant species across the landscape provide ample food resources to both generalist and specialist insect species. Although the association between *Vitex obovata* subsp *wilmsii* and *Pycna sylvia* has come under question, until further evidence is presented, the initial association of the species cannot be disregarded, and as such, the high abundance of these trees will contribute to the ongoing food resource of *Pycna sylvia*.

Mine expansion and the construction of roads have resulted in the degradation of the habitat in areas, however the important freshwater, bushveld and mountain habitats are still largely intact and still capable of providing the necessary food resources and breeding areas for insect species.

Habitat requirements vary between species, however, the varied ecotonal terrain and the various habitats overserved within the project area are considered suitable for the continued habitat provision for an abundance and diversity of insect species.

1.g.iv.1.f.6 Arachnids

The arachnid habitat sensitivity is considered Moderately-High.

The Limpopo SoER (2004) does not list any arachnid species, nor are any of the arachnid species as listed on the TOPS (2015) species list expected to occur within the focus area. However, the endemic flat rock scorpion *Hadogenes polytrichobothrius* is known to occur in the proejct areas within Sekhukhune Mountain Bushveld areas where sheet rock is found.

Prendini (2006), the author who described this species, states that “the threat of mining, quarrying, and other forms of habitat degradation, together with the restricted distributional range of this species, which otherwise falls entirely outside of existing protected areas, warrants its assignment to the Vulnerable IUCN [International Union for the Conservation of Nature] Red List Category”. As such, drilling in the sheet rock areas of the Sekhukhune Mountain Bushveld habitat poses a significant risk to this species.

Arachnids by nature are laborious and time consuming to assess and quantify in terms of diversity. Many are secretive and predominantly nocturnal. As such, signs of arachnid activities were actively searched for (burrows, webs, discarded prey items, etc). Taking into account known regional arachnid occurrences, previous studies conducted in the area and surrounding mine properties, food availability and habitat levels, it is considered that the project area will have a moderately high arachnid diversity. Previous studies (Ecorex 2008) found 34 scorpion specimens comprising 5 species within the Two Rivers Platinum Mine. Scorpions observed include the expected *Hadogenes polytrichobothrius* and *Opistophthalmus glabrifrons*. The other species observed include *Parabuthus transvaalicus, Uroplectes triangulifer and Pseudolychas pegleri*. Trapdoor and baboon spiders observed include *Ancylotrypa barbertoni, Ancylotrypa pretoriae, Ctenolophus fenhouleti, Ctenolpohus oomi, Harpactirella flavipilosa* and *Homostola vulpecula*.

Invertebrates and small reptiles are the predominant food sources for arachnid species. The drought conditions and decreased abundance of these species have resulted in a significant food resource shortage for arachnid species within the focus area.

Although the project area in the vicinity of proposed exploration and drilling activities is largely intact in terms of habitat connectivity with limited anthropogenic activities, the net result of long term grazing activities is undeniable, especially evident during the extenuating drought period.

The project area, due to its size and limited transformation in terms of anthropogenic developments remains largely intact, providing ample habitat opportunities for arachnid species. Although the project area is largely suitable in terms of habitat availability, the lack of food resources is a significant determining factor with regards actual arachnid habitation and habitat utilisation.

1.g.iv.1.f.7 Faunal Species of Conservation Concern

The species listed below are considered to have a significant probability of occurring within the project area.

Table 25: Faunal SCC Probability of Occurrence Score (POC) for the focus area.

Scientific name	Common Name	POC %
Mammals		
Panthera pardus	Leopard	100%
Aonyx capensis	Cape clawless Otter	80%
Hyaena brunnea	Brown Hyaena	80%
Chrysospalax villosus	Rough-haired Golden Mole	60%
Avifauna		
Gyps africanus	White Backed Vulture	100%
Falco biarmicus	Lanner Falcon	80%
Sagittarius serpentarius	Secretary bird	60%
Polemaetus bellicosus	Martial Eagle	80%
Neotis denhami	Denham's Bustard	60%
Reptiles		
Python natalensis	African Python	100%
Homoroselaps dorsalis	Striped Harlequin Snake	60%
Platysaurus orientalis fitzsimonsi	Fitzsimon's Flat Lizard	90%
Chamaesaura aenea	Coppery Grass Lizard	80%
Arachnids		
Hadogenes polytrichobothrius	Flat Rock Scorpion	100%
Insects		
Pycna silvia	Cicada	100%

1.g.iv.1.g Hydrological Setting

1.g.iv.1.g.1 General

Dwarsrivier Mine is located in Water Management Area (WMA) 4: Olifants and the greater part of the mine falls within Quaternary Catchment B41G.

Three primary drainage systems, along with their respective tributaries and smaller ephemeral drainage lines, were identified within the Mining Right Area, namely, the Klein Dwarsrivier and Groot Dwarsrivier, which confluence approximately 1.8km south of the northern boundary of the Mining Right Area to form the Dwars River. In addition to these primary systems, several tributaries of each of these systems were identified: the Springkaanspruit and an unnamed tributary draining into the Groot Dwarsrivier from the northeast and southeast respectively, an unnamed tributary of the Dwars River in the north, and a non-perennial unnamed tributary of the Klein Dwarsrivier in the south. Numerous ephemeral drainage lines with riparian vegetation were also identified draining into the Klein Dwarsrivier.

Water drainage on site is in different directions as follows:

- Some water drains toward the Springkaanspruit;
- 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.

The non-perennial stream which has been diverted in the past for the purposes of the opencast operations, drains into the Klein Dwarsrivier, which has its confluence with the Tubatse (Steelpoort) River about 10km downstream of the site. The Steelpoort River joins the Olifants River approximately 60km to the north. It should be noted that it is the remnants of this diversion, which now serves as a drainage channel is located north of the proposed Truck Parking Area.

The Groot Dwarsrivier has its origin on the farm De Berg 71JT some 33.75km (measured in a straight line) to the south of the confluence of the Groot Dwarsrivier with the Klein Dwarsrivier. The Klein Dwarsrivier has its origin on the farm, Uysedoorns 47JT, approximately 25.3km (measured in a straight line) to the south of this river's confluence with the Groot Dwarsrivier. The Springkaanspruit enters the Groot Dwarsrivier from the east some 1.6km upstream from the confluence of the Groot and Klein Dwarsrivier, and has its origin on the watershed between the farms Zwakwater 377KT and Schuins 378KT, some 15.4km (measured along its longest collector) to the east of its confluence with the Groot Dwarsrivier.

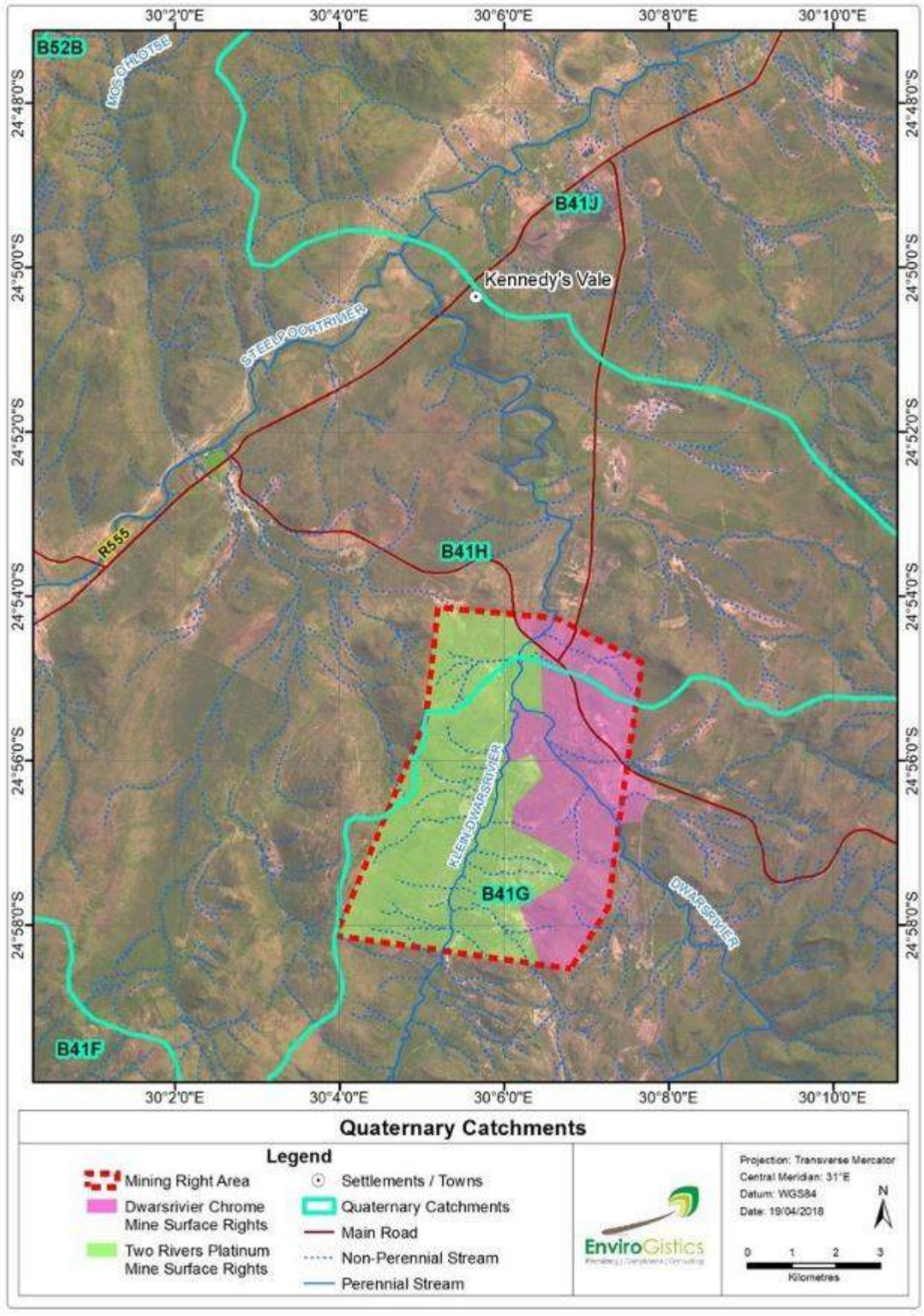


Figure 43: Quaternary Catchments

After the confluence of the Groot Dwarsrivier with the Klein Dwarsrivier, the river continues as the Dwarsrivier for another 15.3km (measured along the course of the river) up to its confluence with the Steelpoort River on the farm, Kennedy's Vale 361KT.

1.g.iv.1.g.2 Project Catchments

The 1:50 and 1:100 year flood lines for the Dwars Rivier, Klein Dwarsrivier and Springkaanspruit, were previously determined for Dwarsrivier Mine (Krige, 2009). However, a number of ephemeral (only flowing in response to high rainfall) drainage lines indicated on the 1:50 000 topographical maps, which are located in close proximity to the proposed exploration drilling holes and access roads, were not determined.

An overview of the catchments delineated to calculate the flood peaks is indicated on Figure 44. The catchment characteristic, Rational Method parameters, and calculated peak flows are summarised in the table below.

Table 26: Catchment characteristics, Rational Method parameters and calculated peak flows

Catchment	MAP (mm)	Catchment Area (km²)	Longest Water-course (km)	Average Slope of Longest Water-course (m/m)	1:50 Year Runoff Coefficient	1:100 Year Runoff Coefficient	Tc (hrs)	1:50 Year Rainfall Intensity (mm/h)	1:100 Year Rainfall Intensity (mm/h)	Peak Flow Method	1:50 Year Peak Flow (m³/s)	1:100 Year Peak Flow (m³/s)
Catchment 1	571	0.06	0.4	0.046	0.309	0.373	0.29	143.4	162.4	Rational	0.7	1.0
Catchment 2	571	0.44	1.5	0.039	0.265	0.319	0.61	92.3	104.7	Rational	3.0	4.1
Catchment 3	571	2.16	2.1	0.158	0.310	0.370	0.48	105.9	120.1	Rational	19.7	26.6
Catchment 4	571	0.17	0.5	0.065	0.327	0.344	0.35	128.4	145.5	Rational	2.0	2.3
Catchment 5	571	0.80	1.6	0.219	0.349	0.367	0.39	119.6	135.6	Rational	9.3	11.0
Catchment 6	571	0.30	0.9	0.077	0.302	0.318	0.40	116.9	132.5	Rational	3.0	3.6
Catchment 7	571	0.60	1.7	0.144	0.323	0.340	0.39	119.4	135.3	Rational	6.4	7.6
Catchment 8	571	0.10	0.7	0.060	0.266	0.278	0.44	110.9	125.8	Rational	0.8	1.0
Catchment 9	571	1.03	1.7	0.135	0.341	0.358	0.46	109.0	123.6	Rational	10.6	12.7
Catchment 10	571	1.46	2.8	0.208	0.342	0.359	0.54	98.7	111.9	Rational	13.6	16.3
Catchment 11	571	0.72	0.9	0.032	0.322	0.339	0.68	86.2	97.7	Rational	5.6	6.7
Catchment 12	571	0.65	0.8	0.020	0.282	0.336	0.50	104.3	118.3	Rational	5.3	7.2
Catchment 13	571	1.67	0.8	0.019	0.312	0.372	0.56	96.8	109.7	Rational	14.0	19.0
Catchment 14	571	0.17	0.4	0.030	0.273	0.288	0.51	103.3	117.2	Rational	1.3	1.6
Catchment 15	571	0.36	1.1	0.228	0.419	0.442	0.39	119.2	135.1	Rational	5.0	6.0
Catchment 16	571	6.08	5.0	0.035	0.319	0.334	1.21	61.4	69.6	Rational	33.1	39.3
Catchment 17	571	0.68	1.0	0.059	0.334	0.352	0.48	106.5	120.8	Rational	6.8	8.1
Catchment 18	571	0.36	1.0	0.139	0.294	0.309	0.48	106.3	120.6	Rational	3.1	3.7

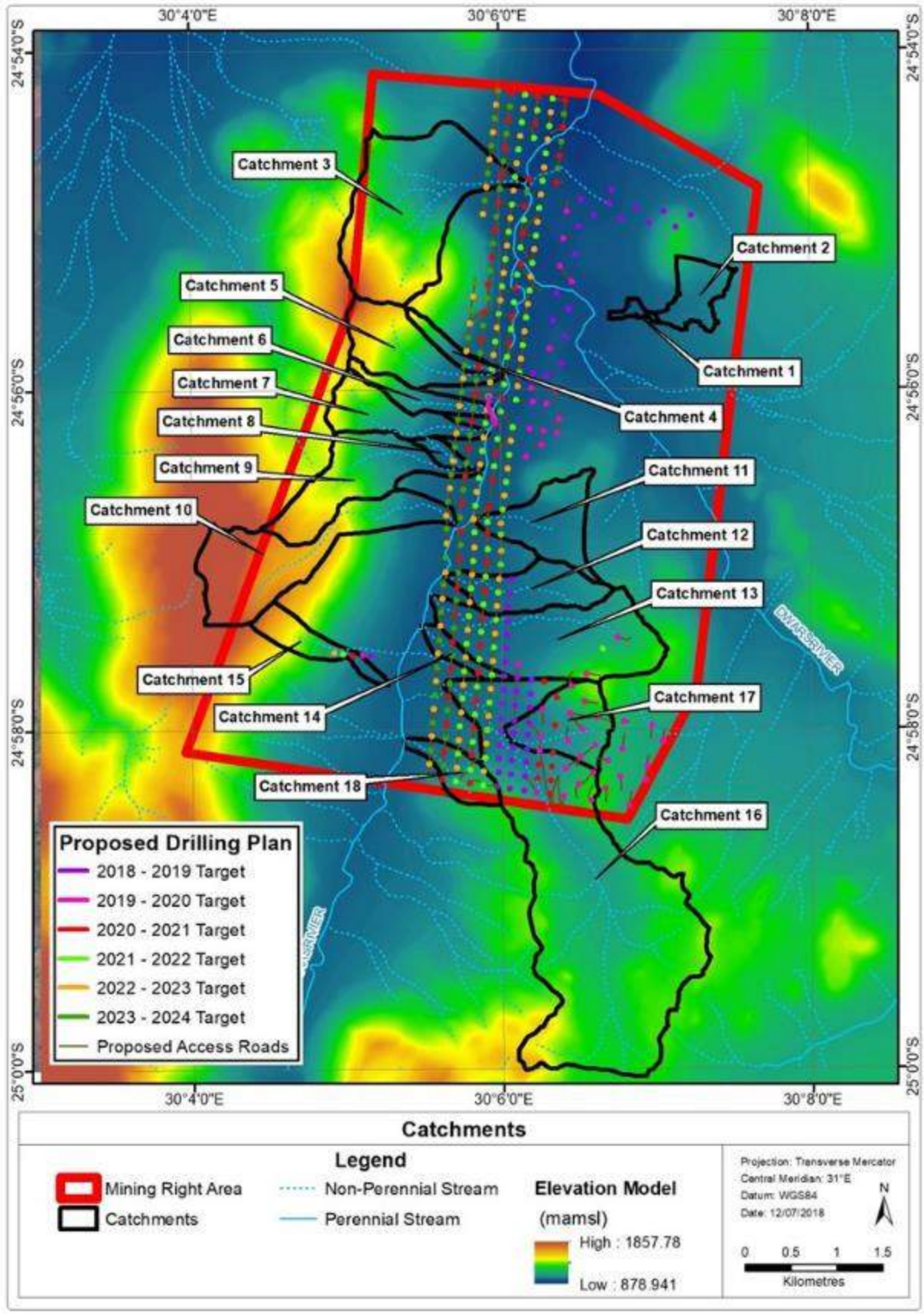


Figure 44: Catchments and general topography

1.g.iv.1.g.3 Historic Drainage Line Assessment (Truck Parking Option 1)

During the site visit, a remnant drainage line/ ditch was noted between the old TSF and Discard Storage Facility. This drainage line was previously diverted to prevent flooding of open pit operations, which have since been

rehabilitated. The diversion is still currently in place (Figure 45), and diverts runoff away from the North RWD and into the Springkaanspruit.

The drainage line near to the proposed Truck Parking Option 1 was confirmed by assessing the 1m contour survey data. A number of cross-sections were drawn through the drainage line indicated on Figure 45. The upper section of the drainage channel, directly to the southeast and south of the Discard Storage Facility, is shallow and not well defined, but becomes more defined and prominent towards the lower sections.

In order to determine whether water would flow down the drainage line and if there would be any contributing catchment area, the topography of the area was assessed. Catchments 1 and 2 were delineated as indicated on Figure 45. This was done as a clean cut-off trench was noted upstream of the drainage line, which diverts runoff around the Discard Storage Facility. However, the cut-off trench was noted to be degraded, as it was blocked by a road and was further noted to be blocked at a culvert near the fence below the Sekhukhune road. Catchment 1 considers the upslope clean water cut-off trench to be fully operational, diverting upslope runoff around the Discard Storage Facility. Catchment 2 considers the cut-off trench to be degraded (as noted on the site visit), allowing upslope runoff to pass into the drainage ditch between the old TSF and Discard Storage Facility. The 1:50 and 1:100 year flood lines for Catchments 1 and 2 are indicated on Figure 46 and Figure 47.

1.g.iv.1.g.4 Exploration Sites Flood lines

The 1:50 and 1:100 year flood lines and 100m buffer of drainage lines intersecting the exploration sites associated with the Drilling Project are indicated on Figure 48 to Figure 54 below. A number of drilling targets and access roads are located within the flood lines and 100m buffer in terms of the previous Scoping phase layout. It should be noted that no mining activities may take place within the flood lines or 100m buffer of watercourses, without obtaining exemption from GN704. Furthermore, the drill sites and access roads may potentially disturb drainage lines, triggering a water use in terms of Section 21 (c) and (i) of the NWA. In order to minimise any impact on the drainage lines, it is recommended that they are only accessed during the dry season.

The outcomes of the study by the hydrologist were included into the final project layout. It is important that based on the specialist studies, the drilling sites located in the 1:100 year flood line have been excluded from the project plan.

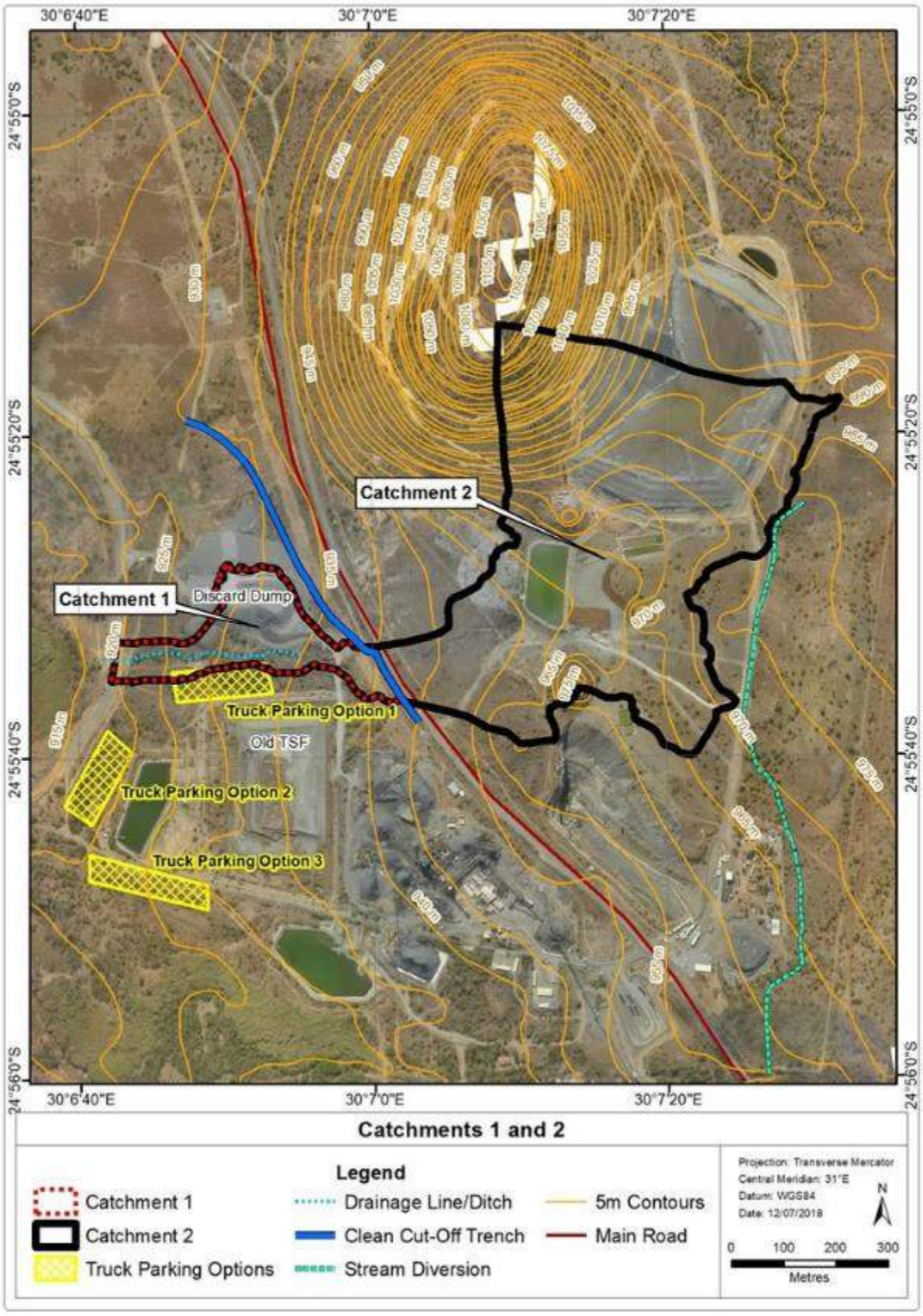


Figure 45: Catchments 1 and 2

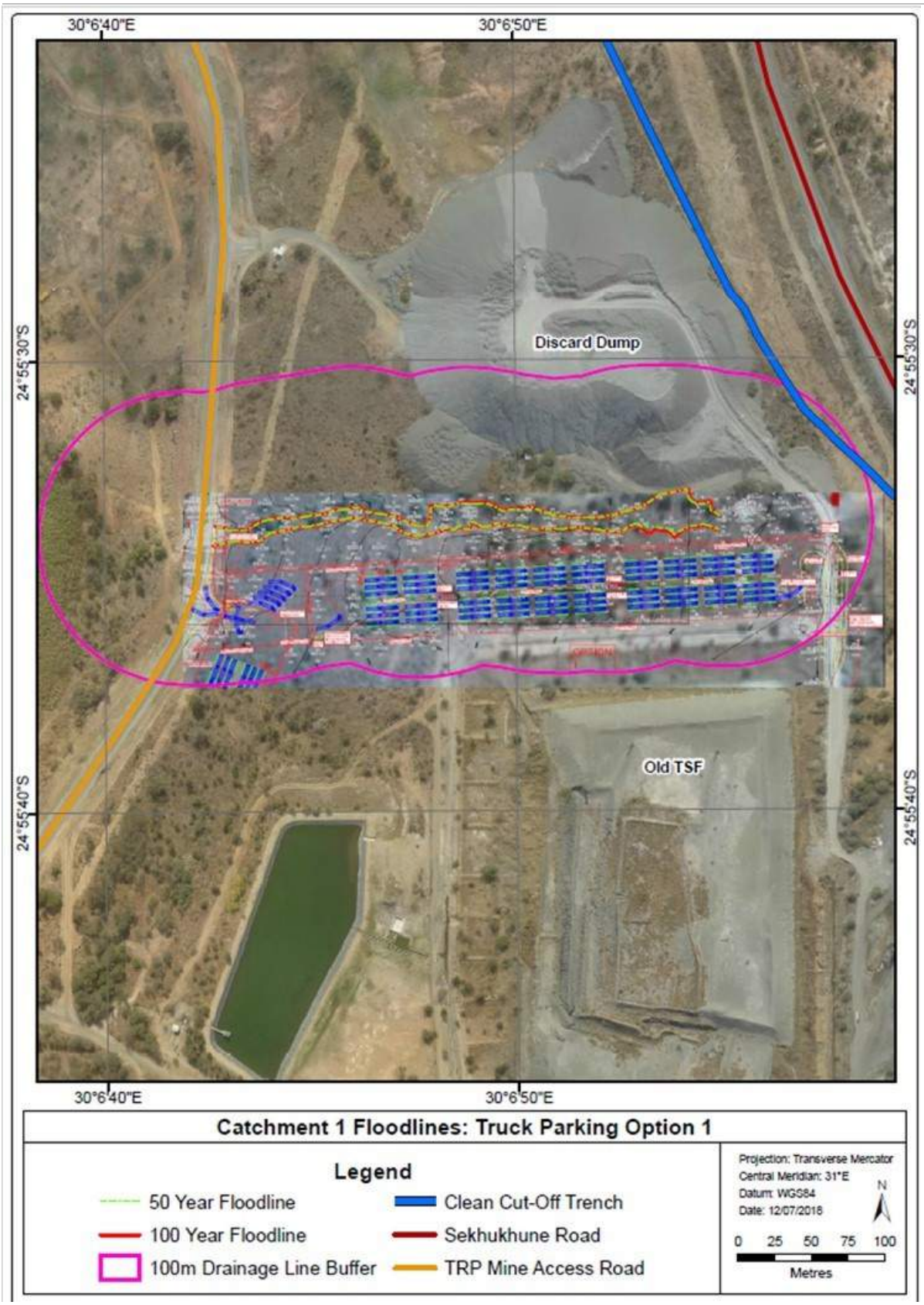


Figure 46: Catchment 1 flood lines and 100m drainage line buffer (with maintenance undertaken)

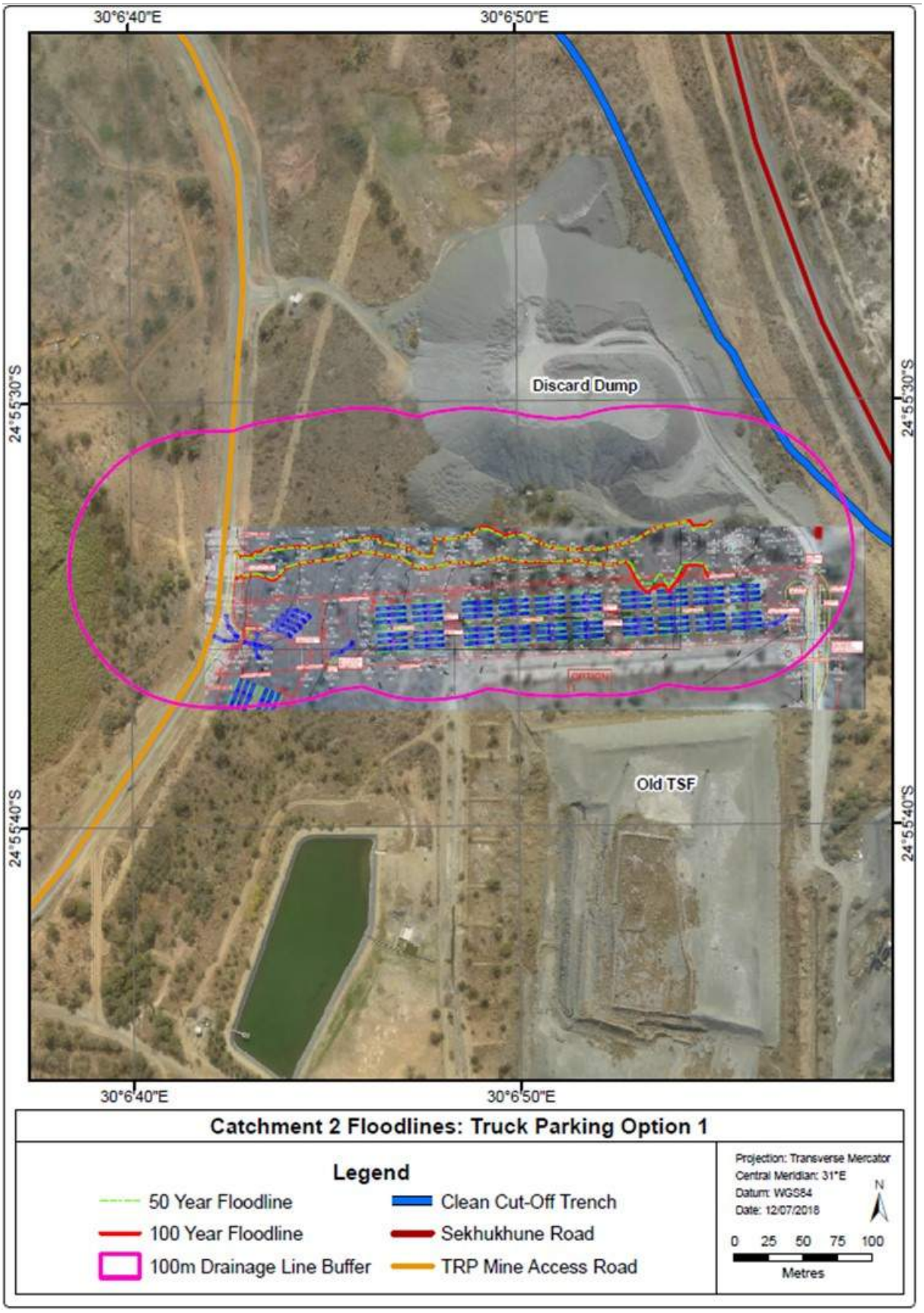


Figure 47: Catchment 2 flood lines and 100 m drainage line watercourse buffer

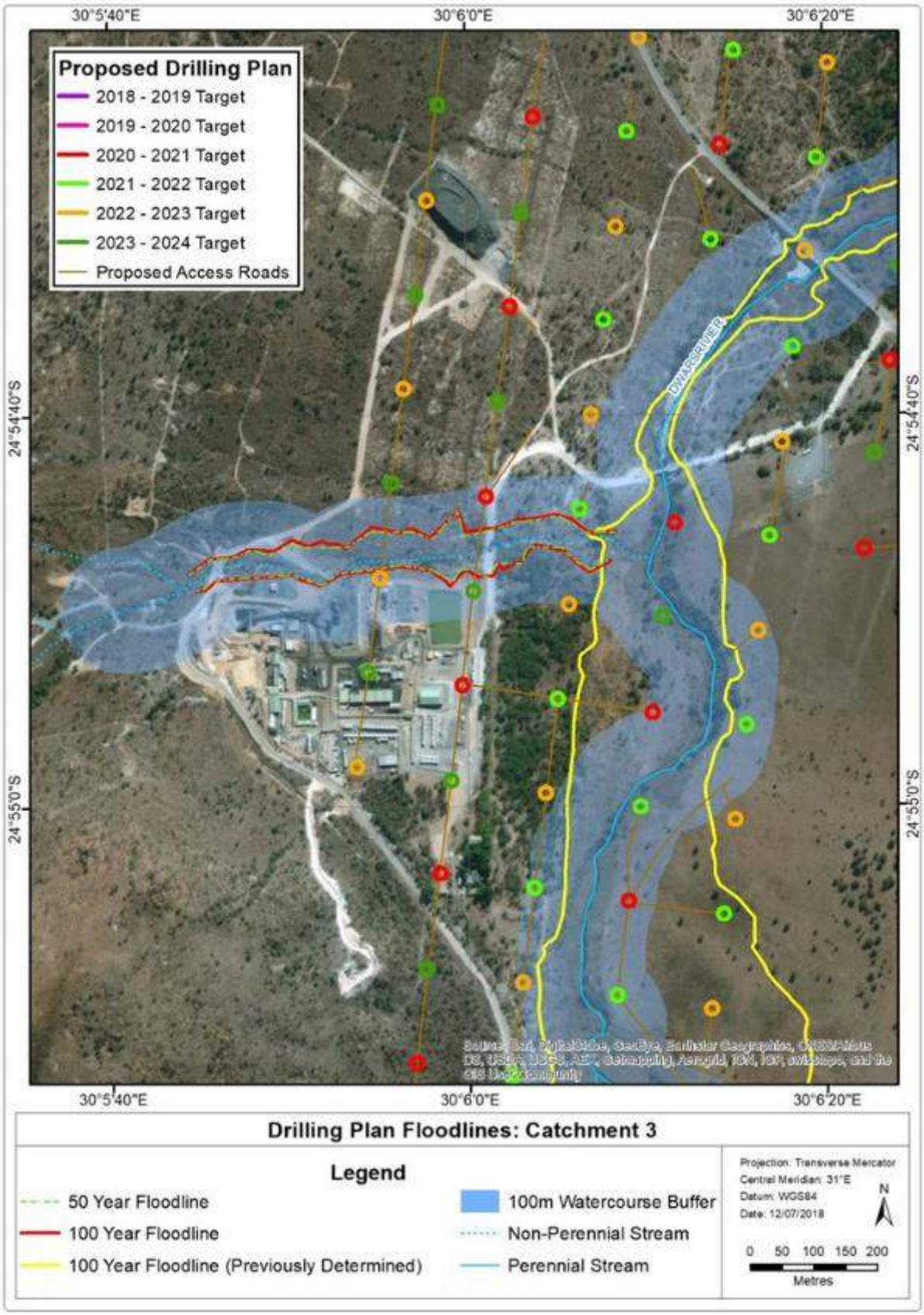


Figure 48: Catchment 3 flood lines and 100m watercourse buffer

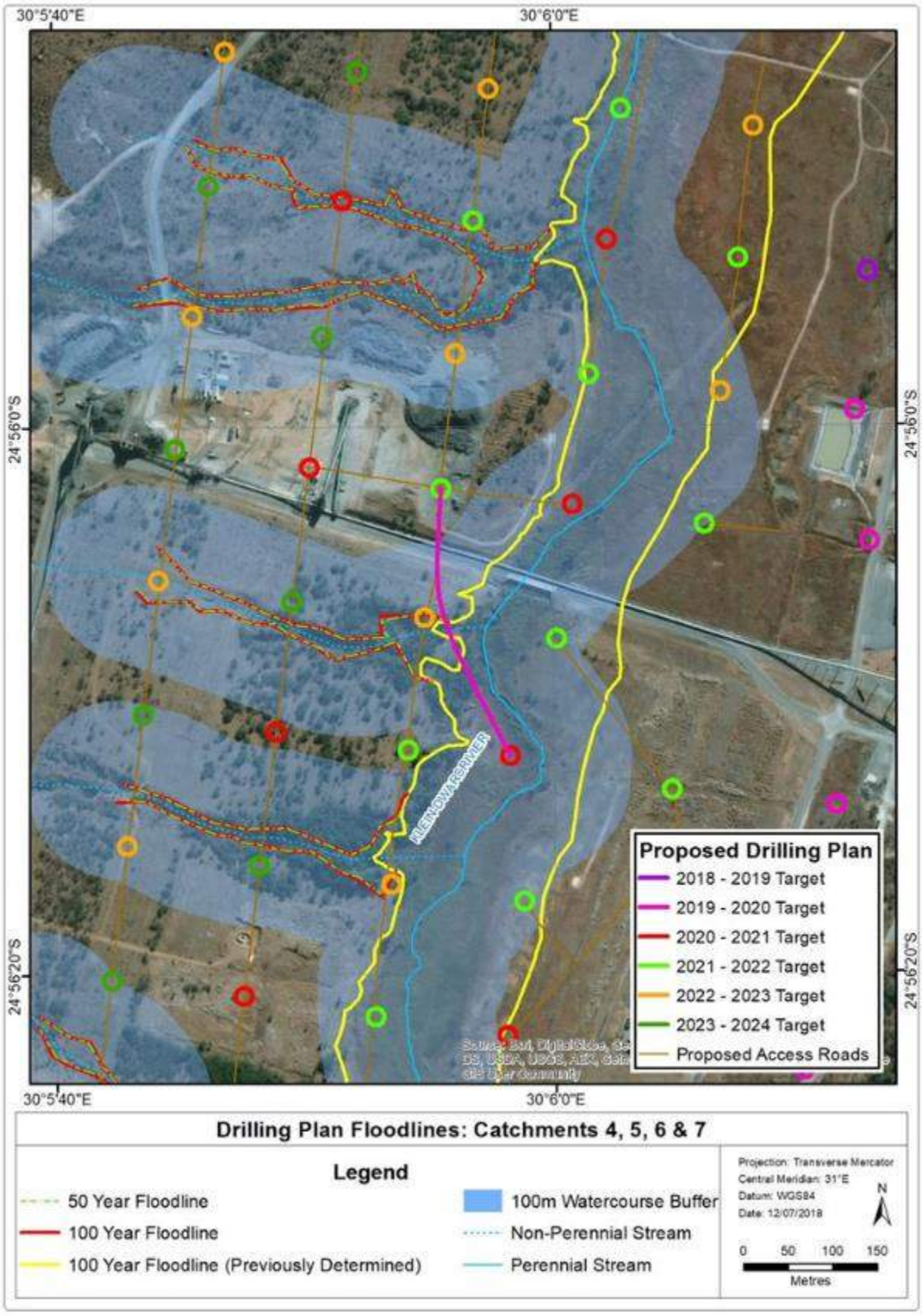


Figure 49: Catchment 4, 5, 6 and 7 flood lines and 100m watercourse buffer

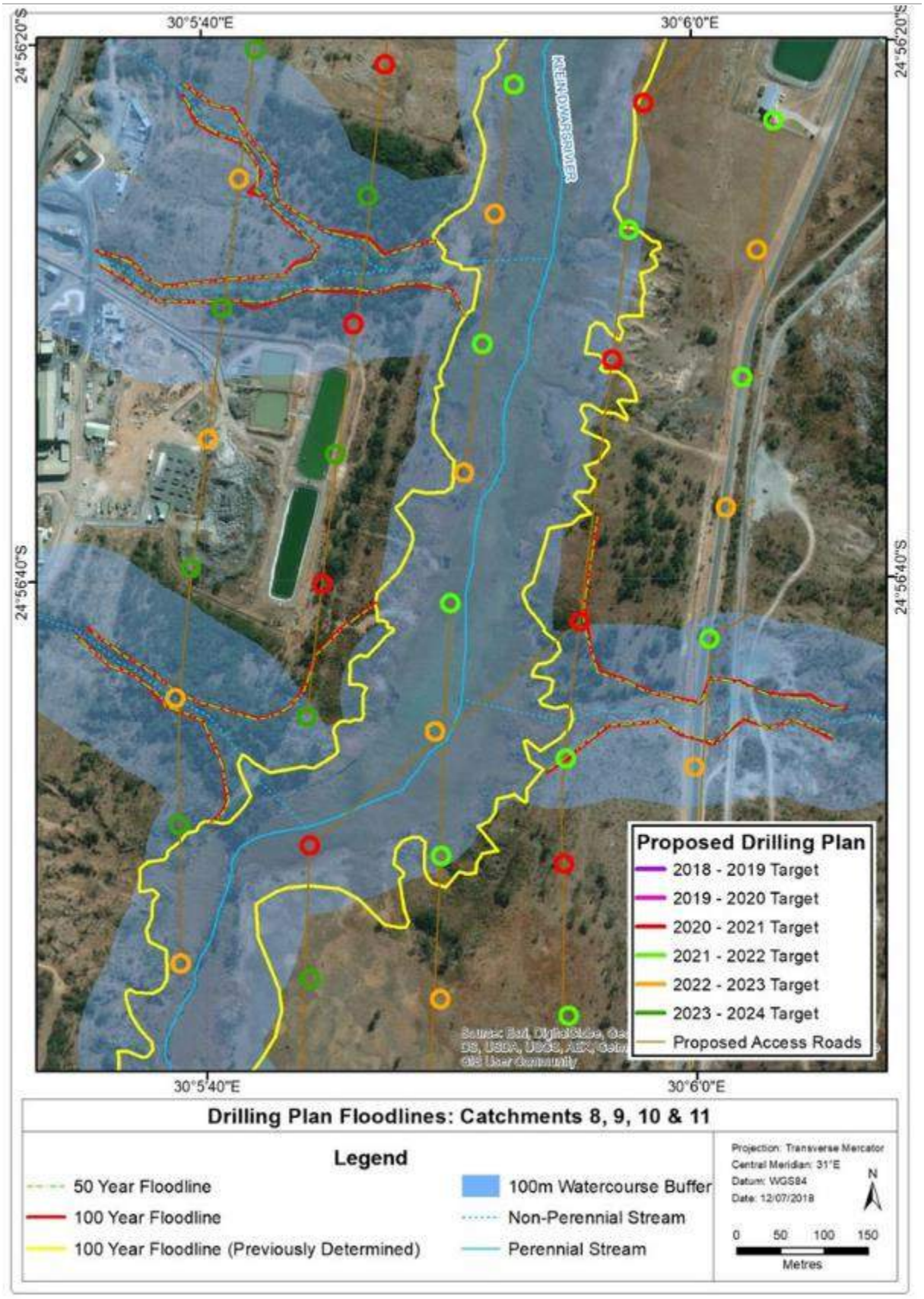


Figure 50: Catchment 8, 9, 10 and 11 flood lines and 100m watercourse buffer

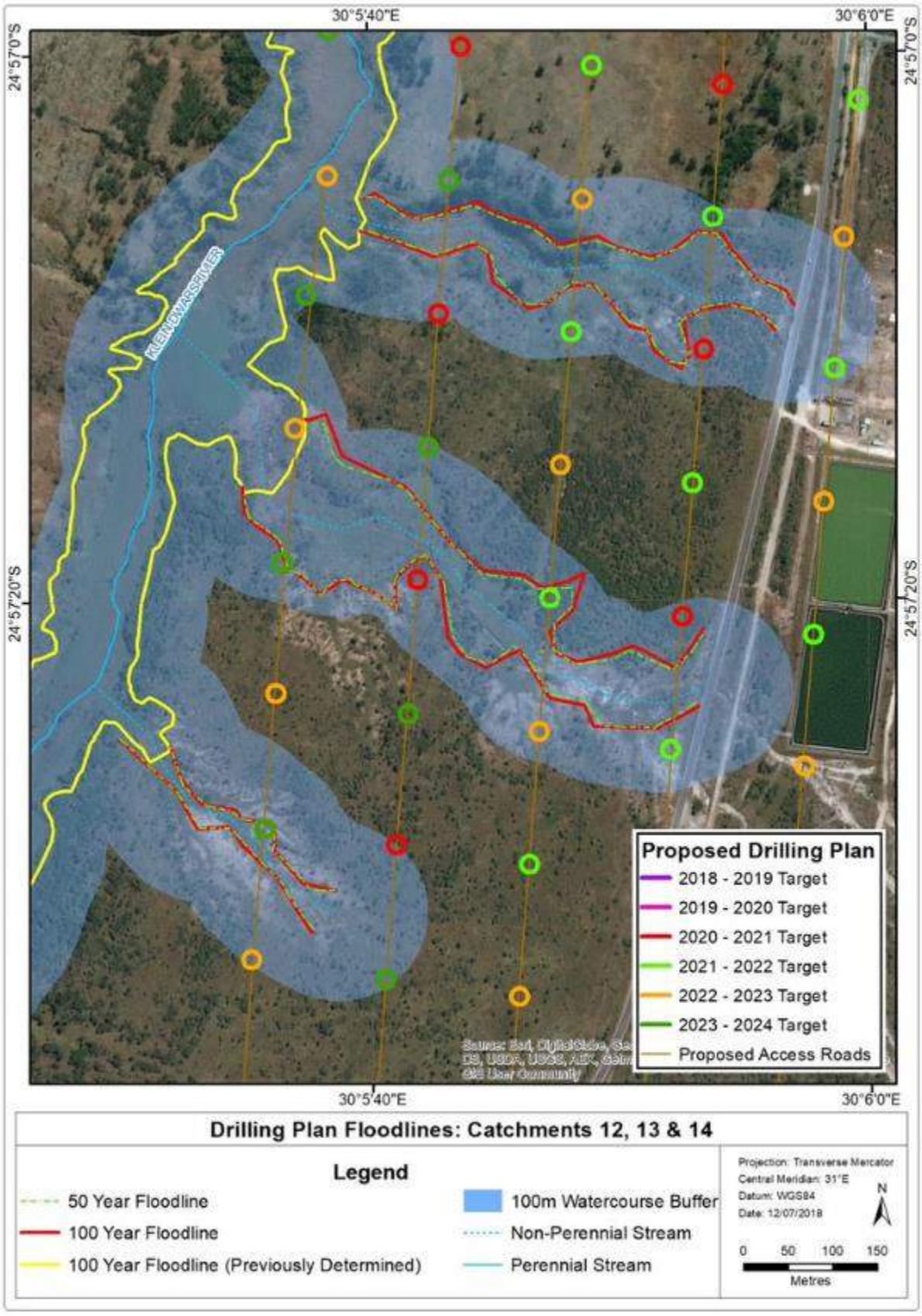


Figure 51: Catchment 12, 13 and 14 flood lines and 100m watercourse buffer

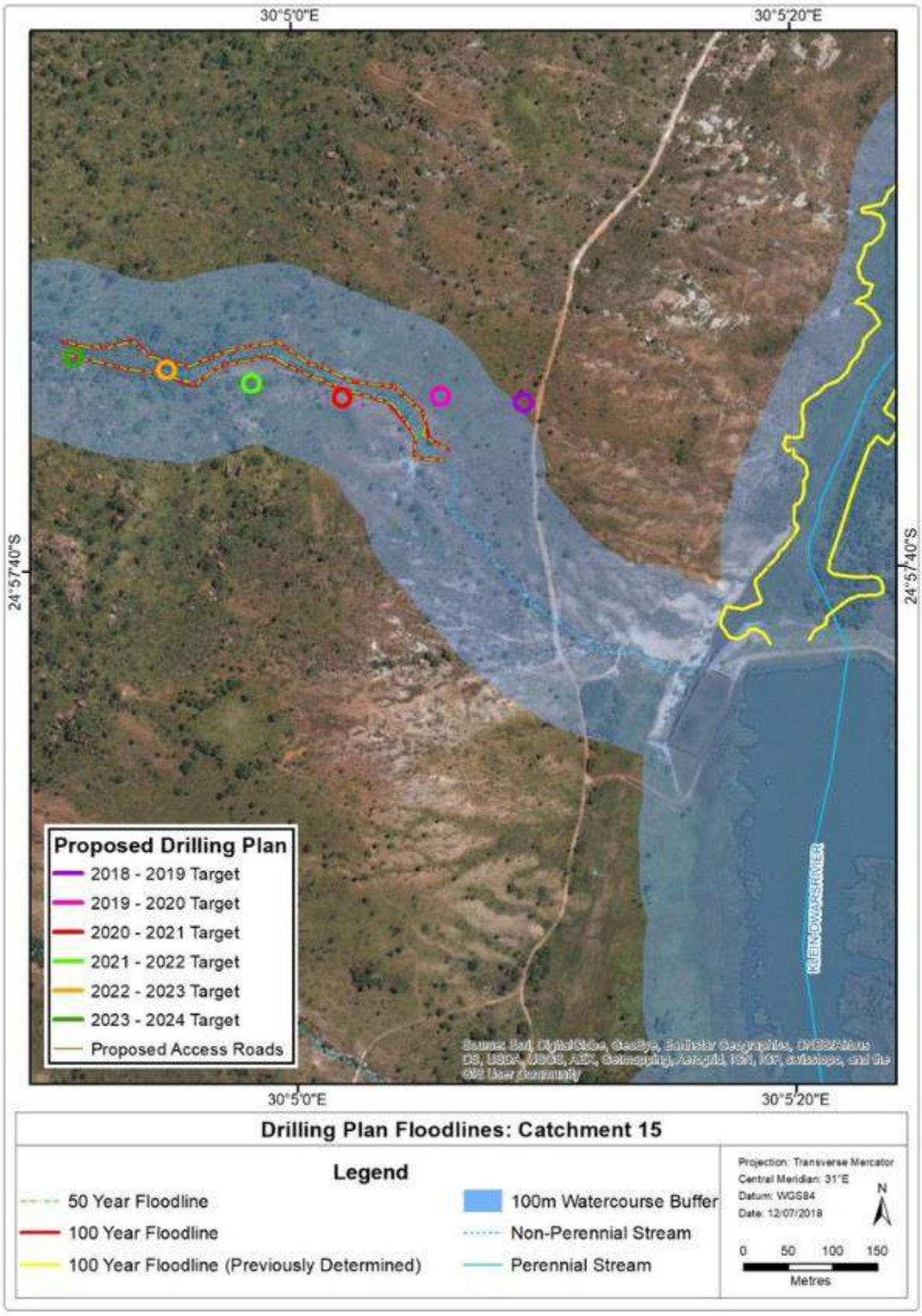


Figure 52: Catchment 15 flood lines and 100m watercourse buffer

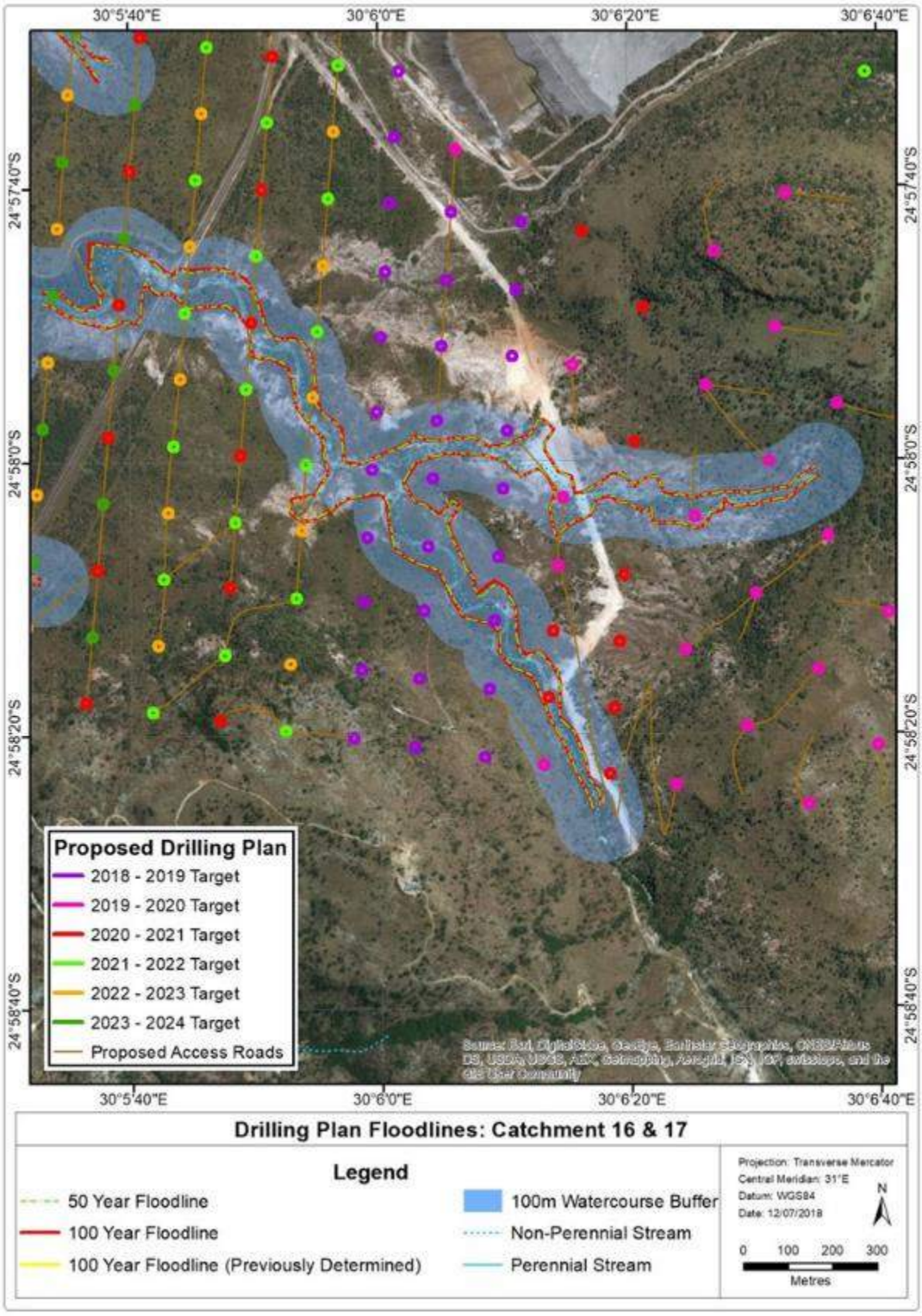


Figure 53: Catchment 16 and 17 flood lines and 100m watercourse buffer

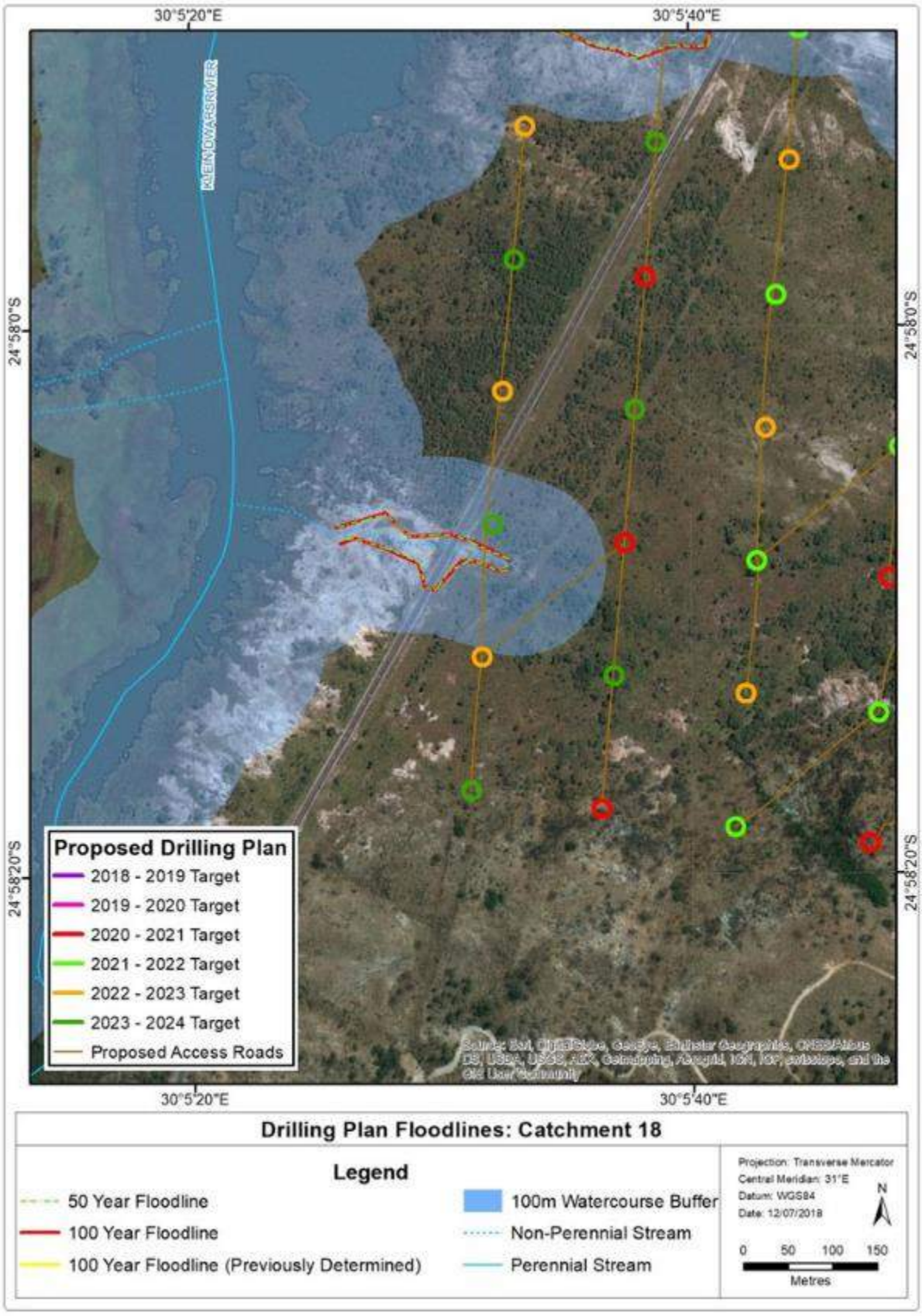


Figure 54: Catchment 18 flood lines and 100m watercourse buffer

1.g.iv.1.g.5 Water Quality

The following sections describes the upstream (S1) and downstream (S2) water quality. S1 (upstream of Dwarsrivier Mine) is Located downstream of the Everest, Der Brochen, Mototolo, Helena and Thorncliffe mines, while S2 (downstream of Dwarsrivier Mine) is Located downstream of the mine on the Groot Dwarsrivier.

S1:

- Electrical Conductivity (EC) increased by 82.2% when compared to the initial assessment (August 2002) and by 13.2% when compared to the previous season (May 2017). The temporal change from initial data exceeds the DWS target water quality guideline (DWAF, 1996) (Table 2 of the Aquatic Assessment in Annexure 6), which advocates that seasonal and temporal changes should not exceed 15%;
- EC long-term temporal trends show short-term variability, but overall an increasing trend is evident in EC with values which have doubled since the inception of the monitoring program. Both short-term variability and long-term increase are indicative of catchment-wide impacts prior to any impact from the Dwarsrivier Mine activities, with specific mention of upstream mining activities;
- However, with the expected EC ranging from 45 - 80 mS/m as stipulated in the Olifants River Ecological Water Requirements Assessment (OREWRA, 2001) for the Lower Olifants, Steelpoort River: Sections 1 to 9 for the month of May, the absolute EC values could be considered as largely natural until recent times when the dissolved salt concentration can be said to have become elevated;
- Catchment-wide impact is also suggested by algal proliferation observed on rocks, as well as signs of sedimentation in the system at this point (although this can at least be partially attributed to rehabilitation efforts at the upstream bridge crossing). Furthermore, lack of strong flow and flow variability are considered significant natural attributes of the system, which will naturally constrain the diversity and sensitivity of the taxa in the system;
- When compared to the initial assessment the pH decreased by 15.8% and increased by 0.6% when compared to the previous season assessment. The former exceeds the DWS target water quality guideline (DWAF, 1996) (Table 2 of the Aquatic Assessment in Annexure 6) which advocate that seasonal and temporal changes should not exceed 5%. However, the pH value complies with the pH range of 7.0 to 8.5 as recommended by OREWRA (2001) for a river in this section of the catchment and no adverse effect from catchment wide mining on aquatic ecology is anticipated at the time of assessment;
- Dissolved oxygen (DO) saturation can be considered as adequate in supporting a diverse and sensitive aquatic community, as it complies with the 80% saturation requirement (DWAF, 1996);
- DO concentrations are highly variable over time and largely dependent on seasonality.

S2:

- EC increased by 131.1% when compared to the initial assessment (August 2002) and by 8.9% when compared to the previous season (May 2017). The temporal change from initial data exceeds the DWS target water quality guideline (DWAF, 1996) (Table 5 of the Aquatic Assessment in Annexure 6), which advocates that seasonal and temporal changes should not exceed 15%;
- As for upstream site S1, EC is variable but overall, an increasing trend is evident. This is indicative of salt loading in the system, and likely due to cumulative catchment wide impacts from upstream mining activities, as well as possible contribution from the Dwarsrivier Mine activities. However, spatial comparison (see Table 8 of the Freshwater and Aquatic Assessment in Annexure 6) suggests that any potential impact from Dwarsrivier Mine on salt load was not significant at the time of assessment. Lack of strong flow and flow variability may also contribute to observed long-term variations in EC;
- However, with the expected EC ranging from 45 – 80 mS/m as stipulated in the OREWRA (2001) for the Lower Olifants, Steelpoort River: Sections 1 to 9 for the month of May, the absolute EC values can be considered as largely natural;
- When compared to the initial assessment the pH increased by 9.0% and remained unchanged when compared to the previous season assessment. The former exceeds the DWS target water quality guideline (DWAF, 1996) (Table 5 of the Aquatic Assessment in Annexure 6). However, the pH complies with the pH range of 7.0 to 8.5 recommended by OREWRA (2001) for a river in this section of the catchment, and no adverse effect from mining on aquatic ecology is anticipated at the time of assessment;
- DO saturation can be considered as adequate in supporting a diverse and sensitive aquatic community, as it complies with the 80% saturation requirement (DWAF, 1996);
- DO concentrations are highly variable over time and largely dependent on seasonality.

1.g.iv.1.h Hydrogeological Setting

1.g.iv.1.h.1 Description of Aquifers

There are three main aquifers found in the area (iLEH, 2010). These include:

1. A shallow weathered aquifer present in the upper 20m of the geological succession.
2. 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. For the purpose of this study, the floor of the LG6 chromitite seam will be assumed as the depth of the fractured rock aquifer.
3. 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.

The results of aquifer test undertaken historically on monitoring show that the transmissivities of the boreholes vary between 0.3 and 128m^2/d. The lower transmissivities are associated with the fractured rock aquifer, while higher transmissivities represent the alluvial aquifer.

1.g.iv.1.h.2 Boreholes Present

The mine monitors 17 boreholes around the operations. The boreholes are listed in the following table and are indicated on Figure 55 thereafter. The table also indicates the depth to groundwater in these boreholes. It is shown that groundwater occurs at depths as shallow as 1,5m below surface and as deep as 20m. The average depth to groundwater is around 7,5m below surface.

Table 27: Monitoring boreholes present

BH ID	X Coord	Y Coord	Groundwater level measurements in calibration period (mamsl)							
			Feb-13	May-13	Aug-13	Nov-13	Feb-14	May-14	Aug-14	Nov-14
DRM1	-89816	-2758440	2,94	2,94	2,94	4,09	3,78	3,28	4,13	4,1
DRM2	-89788	-2758348	2,49	2,49		3,65	3,50	2,78	3,50	3,28
DRM3	-89678	-2758008	1,23	1,59	1,59	4,53	3,27	2,30	2,62	3,01
DRM4	-89197	-2758651	7,74	7,81	7,81	10,31	8,74	7,33	8,82	9,12
DRM5	-89421	-2758684	1,15	1,15	1,15	1,69	1,50	1,02	1,78	2,15
DRM6	-89052	-2759328	7,69	8,12	8,12	8,84	8,47	7,03	8,69	8,79
DRO4	-89845	-2758286	1,92	1,81	1,81	1,66		1,05	1,67	1,66
ASDW BH 1	-88526	-2758381	19,18	19,23	20,57	21,87	20,52	18,85	12,54	22,67
ASDW BH 2	-88536	-2757229	30,93	13,04	15,72	9,59	14,18	14,64	14,62	15,17
ASDW BH 3	-88950	-2758088	4,01	4,70	9,15	10,59	7,51	4,54	7,96	9,77
ASDW BH 4	-88487	-2757923	18,14	17,67	19,48	19,91	19,70	18,38	16,70	20,21
ASDW BH 5	-89193	-2759149	8,56	9,20	10,60	10,96	8,85	6,96	10,88	11,47
ASDW BH 6	-89076	-2759194	7,93	8,29	9,93	10,10	8,51		9,73	11,15
ASDW BH 7	-88176	-2759297	8,80	8,86			9,00	8,62	9,42	9,68
ASDW BH 9	-89567	-2758423	1,48	1,38	2,53	3,29	2,93	1,97	3,20	
ASDW BH 10	-89275	-2758135	2,61	4,01	4,78	4,97	4,75	4,22	4,71	4,75
ASDW BH 11	-88532	-2759127	13,77	14,01	15,00	16,38	14,29	13,72	15,10	16,34

Groundwater is used as water supply to the operations. Groundwater is abstracted from six boreholes. Their locations are indicated on the Figure 55. Past and current groundwater abstraction patterns are summarised in the table below.

Table 28: Groundwater abstraction volumes

WULA name	Previous name	Coordinates		Abstraction rate	Use
BHD1	BH1	S24°55'41.59"S	E30° 6'34.24"E	660 035 m^3/a 904 m^3/d per borehole	Alluvial boreholes used for process and drinking water supply. Twin boreholes
BHD2	BH2	S24 55'41.59"	E30 06'34.24"		
BH A	BH4	S24°56'10.50"S	E30°7'34.2"E	71 520 m^3/a 65 m^3/d per borehole	May be used in future for dust suppression.
BH B	BH5	S24°56'9.50"S	E30° 7'32.2"E		May be used in future for dust suppression
BH E	BH4+5	S24°56'15.70"S	E30° 7'38.40"E		Drinking water to the offices
BH C	North Pit	S24°56'15.70"S	E30° 7'38.40"E		Drinking water to North Pit

The groundwater flow patterns for the project area are presented in Figure 56. The information indicates that groundwater flows in a westerly direction towards the Klein Dwarsrivier at a gradient of 0.03.

1.g.iv.1.h.3 Groundwater Quality

The mine maintains an extensive groundwater quality-monitoring database over the period November 2000 to present date. Nitrate (NO_3) has been identified as the priority contaminant for the operations. Average long-term and 2015/6 nitrate concentrations are presented in Table 29 for comparison. The concentrations are compared to possible past, current and future sources of nitrate contamination to groundwater in the table. It is shown that historical impacts associated with the old TSF, the plant area and North Pit have the most significant impact on groundwater quality in terms of nitrate concentrations.

All but three of the monitoring boreholes indicate an increase in nitrate concentrations from the 2014 average value reported in the 2015 modelling study. These are indicated in red in the following table. Monitoring borehole DRM1, down gradient of the Upper RWD, old TSF and plant area show a significant decrease from an average concentration of 510mg/l in 2014 to 125mg/l in 2015/16. Borehole DRO4 further down-gradient of these sources also show a reduction in average nitrate concentration. ASDW3, down-gradient of the North Pit RWD also show reduced nitrate concentrations, from 924mg/l in 2014 to 795mg/l in 2015/2016.

The remainder of the monitoring boreholes show an average increase of just under 100 mg/l over the 2-year period.

Table 29: Nitrate concentrations in monitoring boreholes (mg/l)

BH ID	Long-term average NO_3	2014 average NO_3	2015/6 average NO_3	Past and current possible sources of NO_3	Future possible sources of NO_3
DRM1	176	510	**125**	Upper RWD, Old TSF, plant area,	Underground mining, North Pit, old TSF, Upper RWD
DRM2	207	404	NA	Upper RWD, Old TSF, plant area	Underground mining, North Pit, old TSF, Upper RWD
DRM3	189	337	**382**	Northern Waste Rock Dump area	Underground mining, North Pit, old TSF
DRM4	578	869	**999**	Plant area	Underground mining, North Pit, plant area
DRM5	302	435	**581**	Lower RWD	Lower RWD, Open Cast pits
DRM6	10	14	14	Waste rock dump, South Pit, Underground mining	Underground mining, South Pit
DRO4	31	169	**39**	Upper RWD, Old TSF, plant area	Underground mining, North Pit, old TSF, Upper RWD
ASDW1	275	260	**315**	North Pit, waste rock dump	North Pit
ASDW2	197	100	**363**	New TSF, Open Cast pits	New TSF, Open Cast pits
ASDW3	587	924	**795**	North Pit, North Pit RWD	Underground mining, North Pit
ASDW4	50	23	**96**	North Pit, waste rock dump	North Pit, new TSF
ASDW5	97	16	**21**	Dam 26, waste rock dump, Underground mining	Dam 26, Underground mining, South Pit
ASDW6	99	18	**35**	Dam 26, waste rock dump, Underground mining	Underground mining, South Pit
ASDW8	510	456	NA	North Pit: Destroyed during mining	North Pit
ASDW7	4	1	4	Waste rock dump	Upstream borehole

BH ID	Long-term average NO_3	2014 average NO_3	2015/6 average NO_3	Past and current possible sources of NO_3	Future possible sources of NO_3
ASDW9	451	436	**580**	Old TSF, plant area	Underground mining, North Pit, old TSF
ASDW10	347	276	**379**	Northern Waste Rock Dump area	Underground mining, North Pit, old TSF
ASDW11	2	1	2	Upstream borehole	Upstream borehole

It is shown that nitrate concentrations in boreholes ASDBH7 and 11 comply with the WUL condition of 6mg/l. Boreholes ASDWBH5 and 6 and DRM6 have nitrate concentrations between 7 and 20 mg/l. Borehole ASDWBH4 falls in the nitrate concentration class of 21 – 50 mg/l. Nitrate concentrations in all other boreholes exceed 100 mg/l, with the highest concentrations observed in DRM4 at the plant and ASDWBH3, situated down gradient of the North Pit RWD.

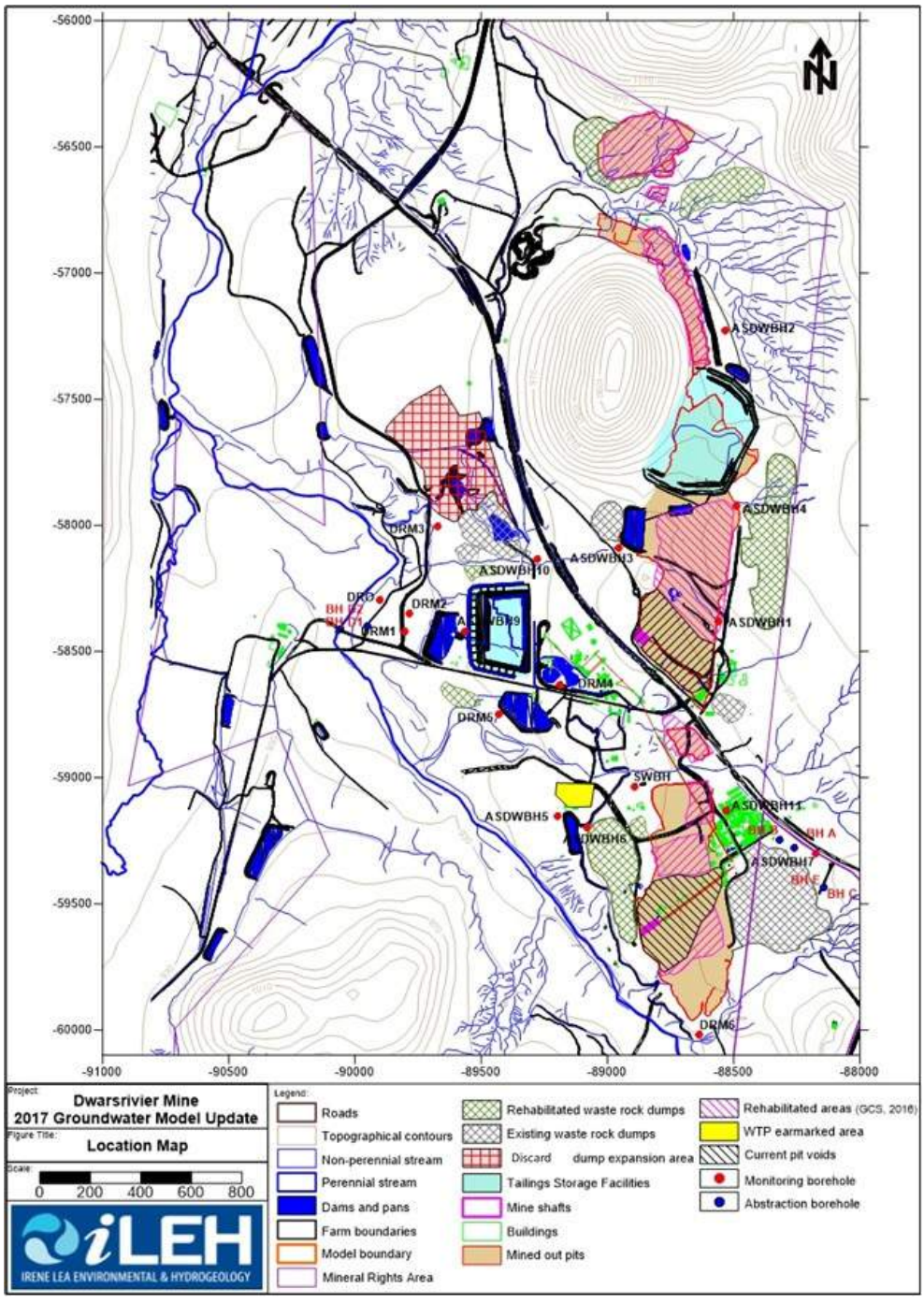


Figure 55: Borehole location map

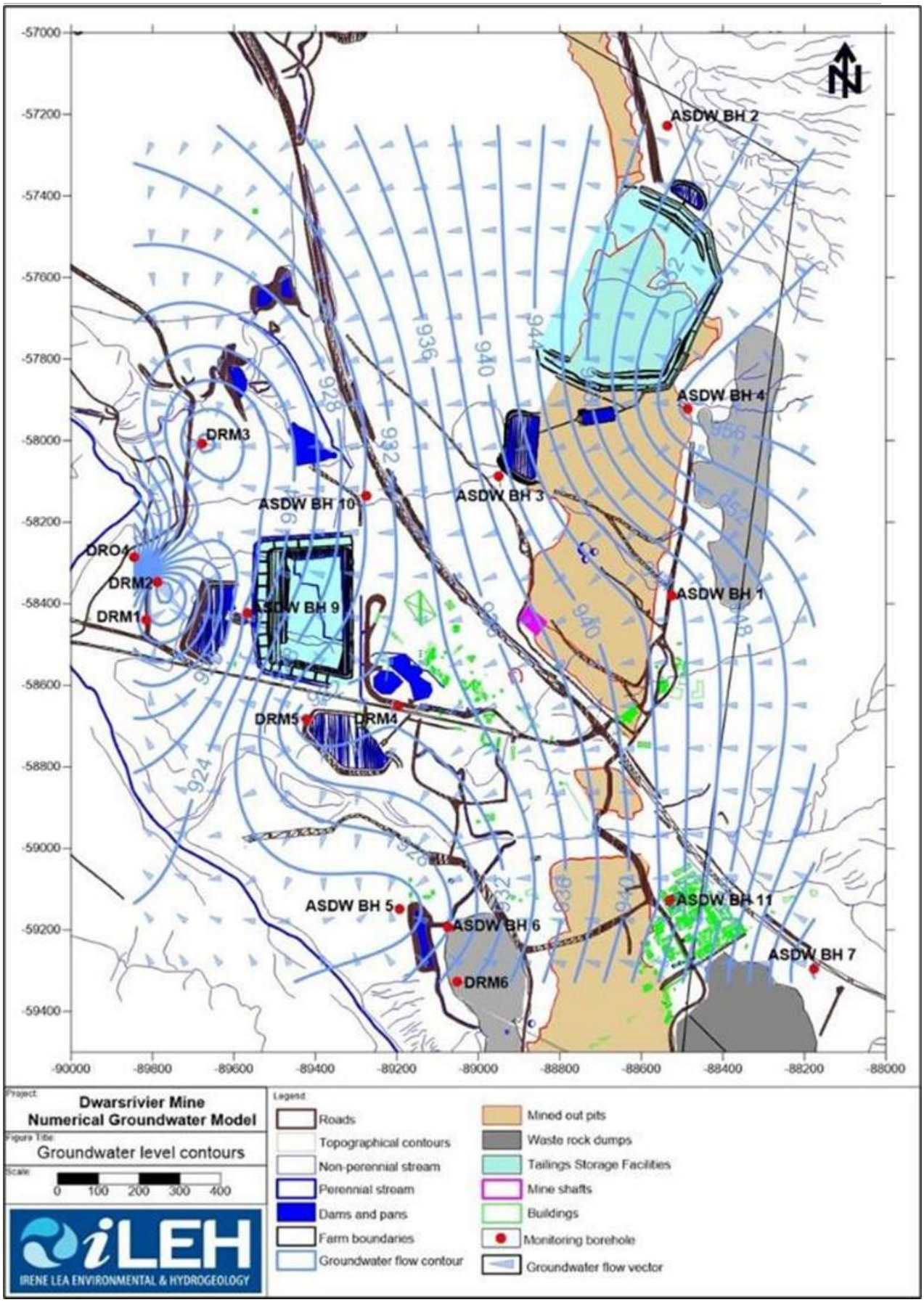


Figure 56: Groundwater flow patterns

1.g.iv.1.h.4 Pathways and critical receptors

The following groundwater preferential flow paths and receptors are identified from the available information:

- The alluvial aquifer will act as a pathway to groundwater due to the fact that it has a higher transmissivity (permeability) compared to that of the weathered and fractured rock aquifers. This aquifer is associated with the floodplains of the rivers and streams.
- The Dwarsrivier fault and the shear zone identified in the underground workings. These structures are assumed to have a higher transmissivity or permeability to the host rocks.
- The north-south striking dolerite dykes. Specifically, the contact zones between the dykes and the host rock are expected to have higher transmissivities or permeabilities.
- The critical receptors for the project area include the Klein and Groot Dwarsrivier and the Springkaanspruit.

1.g.iv.1.i Sensitive Sites or Wetlands

1.g.iv.1.i.1 Sensitive Ecosystem

The Mining Right Area falls within the Central Bushveld Group 1 Wetland Vegetation Type, considered critically endangered (CR).

According to the Limpopo Conservation Plan version 2 (2013) (please refer to Figure 57**Error! Reference source not found.**) the majority of the study area is classified as CBA 1. CBA 1 areas are considered irreplaceable areas required to meet biodiversity pattern and/or ecological processes targets, and no alternative sites available to meet targets.

A section of the western portion of the study area as well as the southern portion are considered to be an ESA 2. These are areas that are important for meeting ecological processes, but from the aerial photographs can be seen to correspond with existing mining infrastructure, where no natural habitat remains.

The figures thereafter conceptually illustrate the areas considered to be of increased floral ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for floral SCC, habitat integrity, levels of disturbance and overall levels of diversity. The table below presents the sensitivity of each area along with an associated conservation objective and implications for development.

Table 30: A summary of the sensitivity of each habitat unit and implications for mining

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Sekhukhune Mountain Bushveld Habitat Freshwater Habitat Unit	High	Conserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered.	The Sekhukhune Mountain Bushveld Habitat Unit and Freshwater Habitat Unit are of high sensitivity. Any disturbance of sensitive floral habitat and SCC must be actively avoided. The drill pads located within sensitive habitat areas should be reconsidered and located to other areas. Edge effects are to be actively managed and all mitigation measures actively employed. Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected tree species before drilling or construction takes place.
Sekhukhune Bushveld Habitat	Moderately High	Conserve and enhance the biodiversity of the habitat unit, limit development and disturbance.	Activities within this habitat unit should be actively and constantly managed, ensuring the activity footprint areas are kept as small as possible. Prior to vegetation clearing the site is to be assessed for the possible presence of floral SCC. Edge effects are to be actively managed and all mitigation measures actively employed. Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected tree species before drilling or construction takes place. All areas are to be suitably rehabilitated post activities.
Old Agricultural Lands	Moderately Low	Conserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	Activities in this habitat unit are unlikely to pose a significant threat to floral species or SCC, however the development footprint should nonetheless be kept as small as possible. Care must be taken to limit edge effects on the surrounding areas of increased sensitivity, notably the freshwater habitat. Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected tree species before drilling or construction takes place. All areas must be rehabilitated post activities.
Transformed Habitat	Low	Conserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	Activities in this habitat unit are unlikely to pose a significant threat to floral species or SCC, however the development footprint should nonetheless be kept as small as possible. Care must be taken to limit edge effects on the surrounding natural areas. All areas must be rehabilitated post activities.

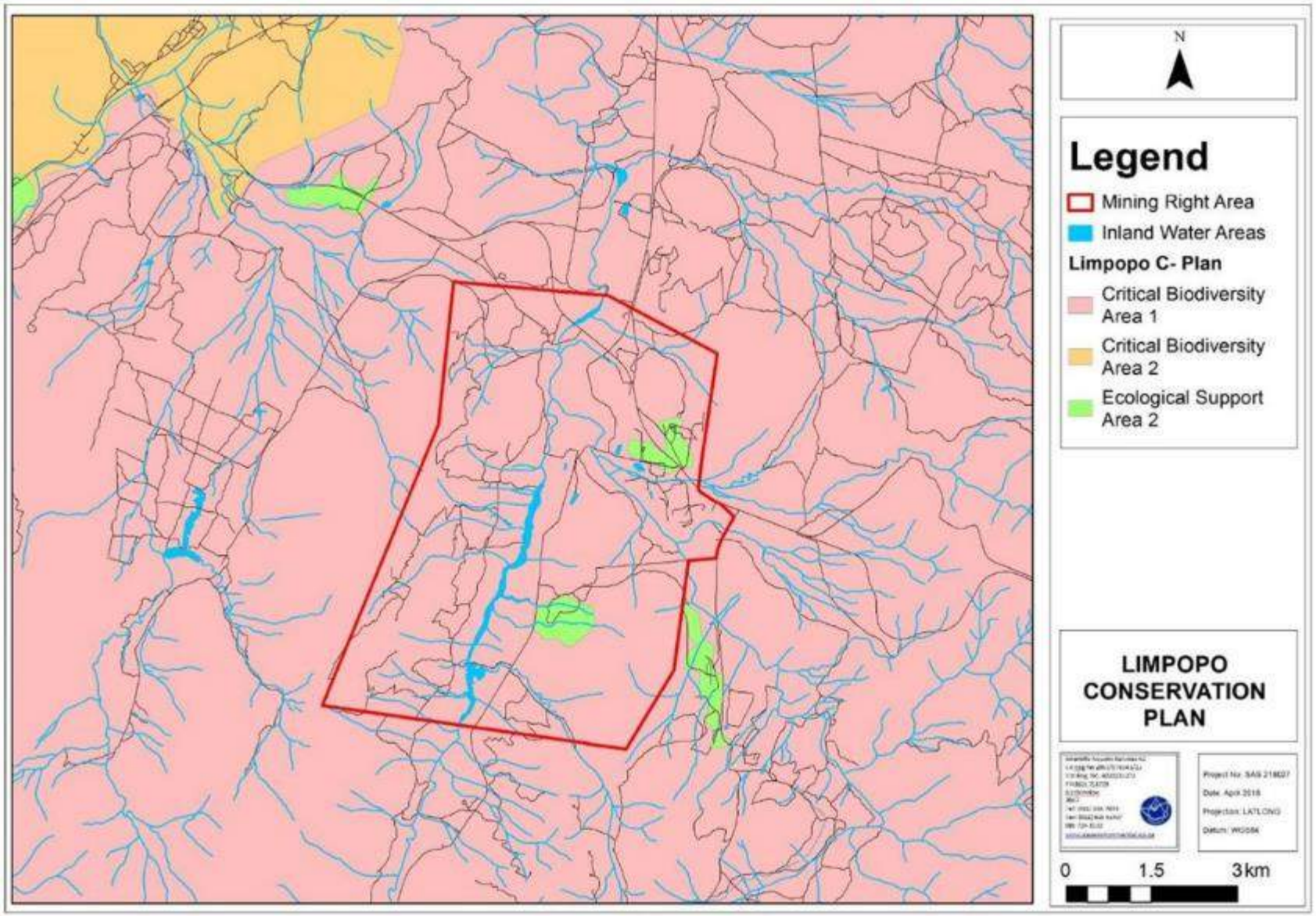


Figure 57: CBA 1 and ESA 2 associated with the area

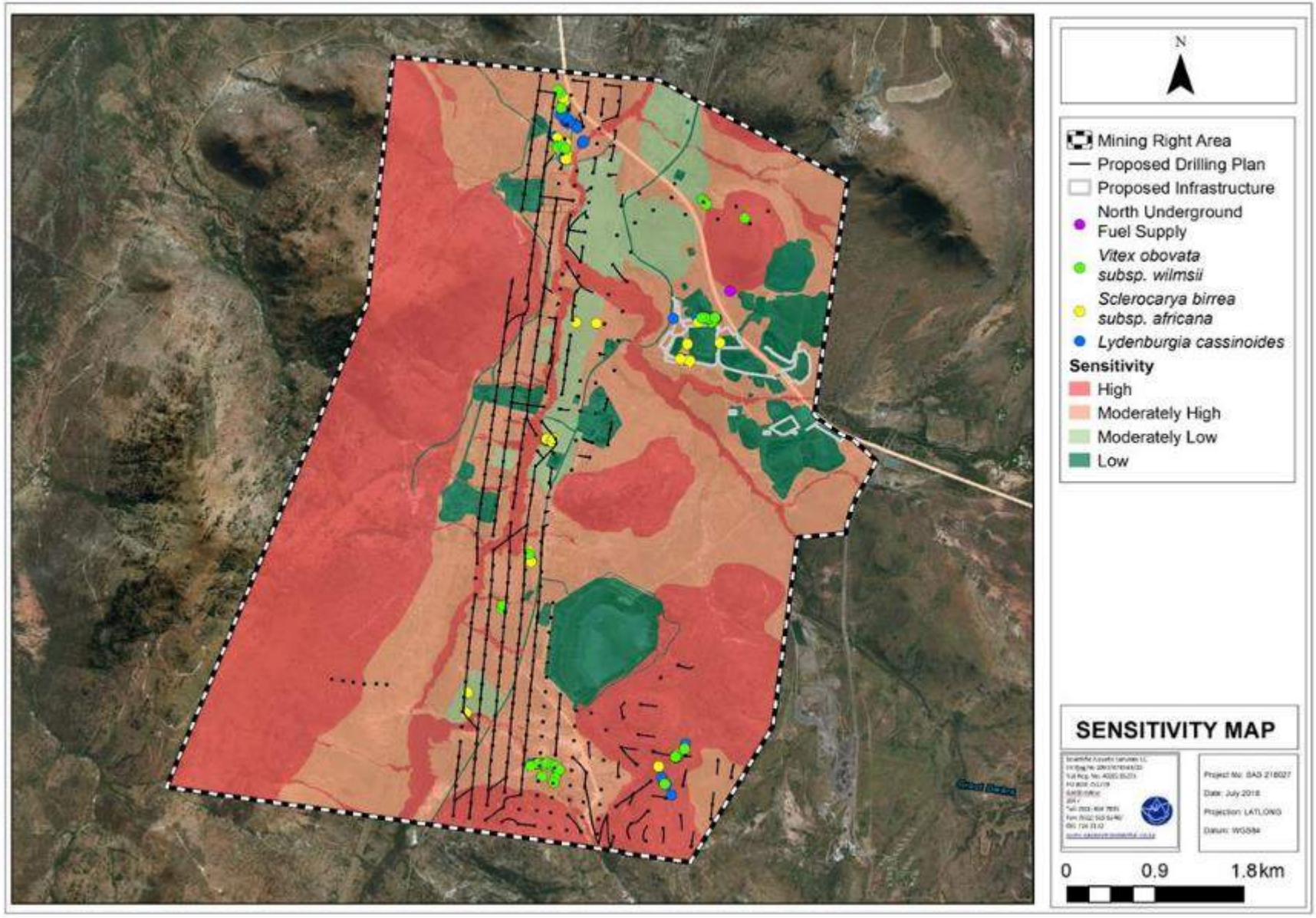


Figure 58: Sensitivity map for the Mining Right Area and associated Drill pads

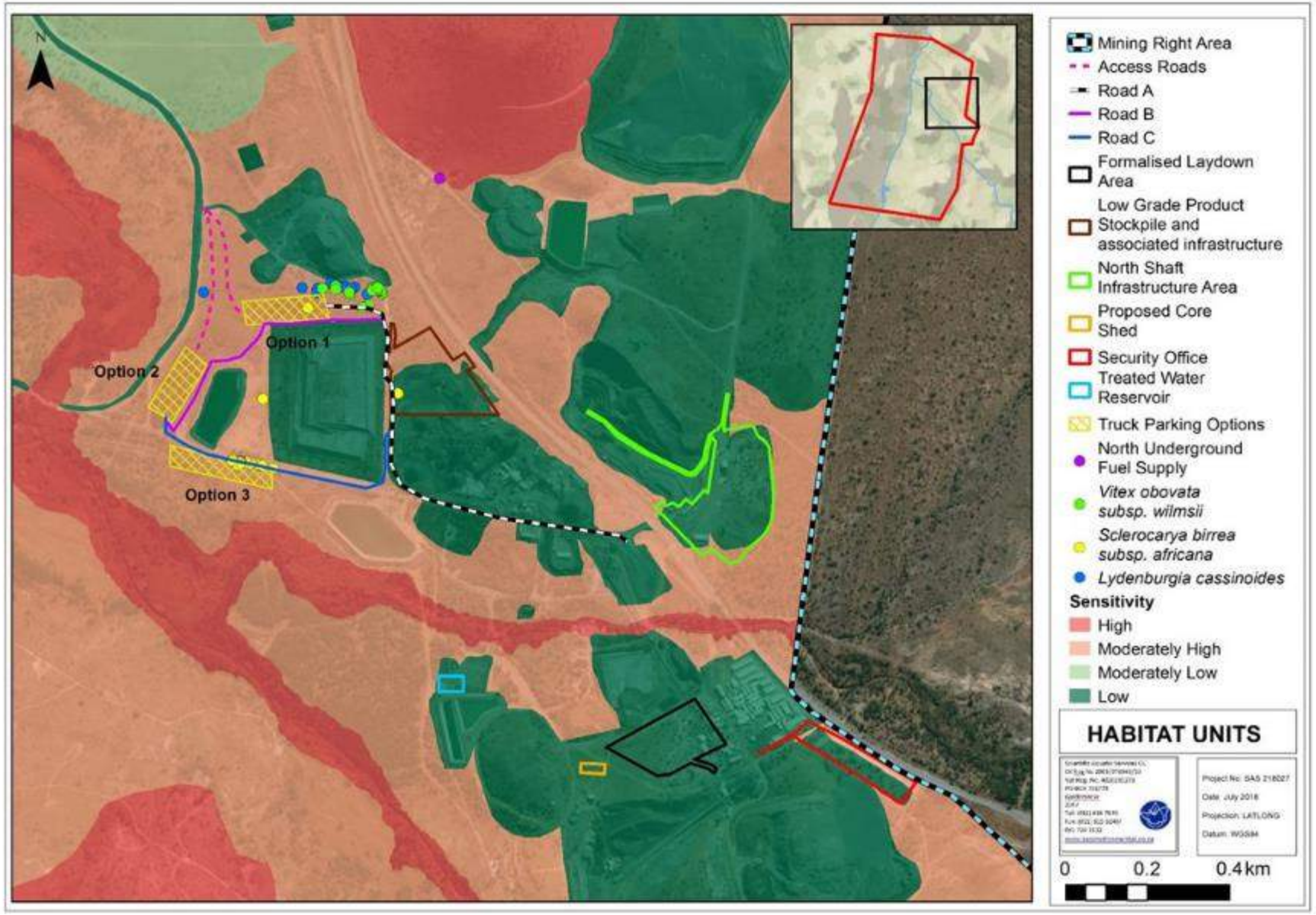


Figure 59: Sensitivity map for the Capital Projects area

1.g.iv.1.i.2 Freshwater and Aquatic Assessment

The majority of the mine falls within an area defined as a Freshwater Ecosystem Priority Area (FEPA), with the northern portion considered a Fish Support Area, and a small portion in the north also considered a Phase 2 FEPA. River FEPAs are important to achieve biodiversity targets for river ecosystems and threatened fish species and include rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, shading of the whole sub-quaternary catchment indicate that that the surrounding land and smaller stream network need 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 are considered Fish Support Areas. Furthermore, the Fish Support Areas include sub-quaternary catchments important for migration of threatened fish species. Phase 2 FEPAs are sub-quaternaries identified as the most efficient set for rehabilitation to an A or B condition to meet under achieved river type targets. The condition of these Phase 2 FEPAs should not be degraded further, as they may in future be considered for rehabilitation.

In terms of the specialist study desktop assessment the following should be noted:

- The database indicates a large, natural, channelled valley bottom wetland to be situated within the central portion of the Mining Right Area, which is considered to be in a natural condition and thus classified as a FEPA Wetland (Figure 60 and Figure 61). Site verification determined that this wetland is the floodplain area associated with the Klein Dwarsrivier;
- The southern portion of the channelled valley bottom wetland is associated with an artificial channelled valley bottom wetland, considered heavily to critically modified (site verification confirmed this to be the Richmond Dam); and
- Additionally, five artificial wetland features, classified as unchanneled valley bottom wetlands in a heavily to critically modified ecological condition, are situated within the eastern portion of the Mining Right Area. Two of the artificial wetland features are associated with natural wetland features also considered FEPA wetlands (Figure 61). However, these areas were extensively investigated during the site assessment, and the artificial wetlands indicated by National Freshwater Ecosystems Priority Areas (NFEPA) database were determined to be mining-related infrastructure such as Pollution Control Dams (PCDs).

Due to the numerous drainage systems identified, as well as the relatively homogenous characteristics of these systems, for assessment and discussion purposes, the drainage systems were grouped as follows:

- Groot Dwarsrivier, Springkaanspruit and unnamed tributary;
- Klein Dwarsrivier;
- Dwars River;
- Unnamed tributary of the Dwars River in the north;
- Unnamed tributary of the Klein Dwarsrivier in the south;
- Ephemeral drainage lines identified to the west of the Klein Dwarsrivier (“Western Ephemeral Drainage Lines”); and
- Ephemeral drainage lines identified to the east of the Klein Dwarsrivier (“Eastern Ephemeral Drainage Lines”).

These systems were classified according to the Classification System (Ollis *et al.*, 2013) as Inland Systems, falling within the Eastern Bankenveld Aquatic Ecoregion, and the Central Bushveld Group 1 WetVeg (wetland vegetation) group, considered by SANBI (2012) and Mbona *et al.* (2014) to be “Critically Endangered”. At Levels 3 (Landscape Unit) and 4 (HGM Type) of the Classification System, all systems were classified as per the summary in the following table. Whilst all systems were primarily classified as river systems, the Groot Dwars, Springkaanspruit and Klein Dwarsrivier also have associated floodplain wetlands along some reaches.

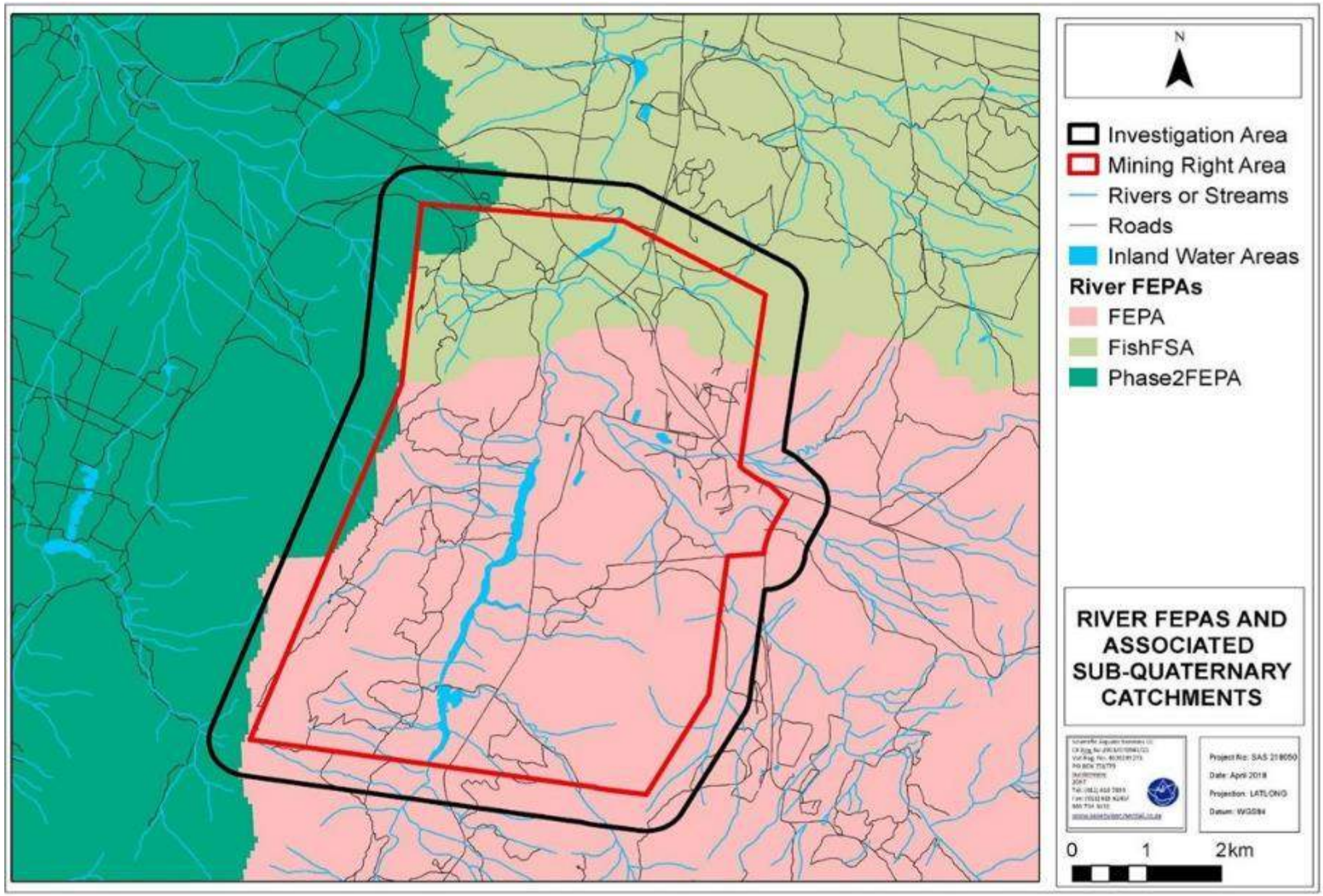


Figure 60: River FEPAS and associated sub-quaternary catchments associated with the Mining Right Area, according to NFEPA (2011)

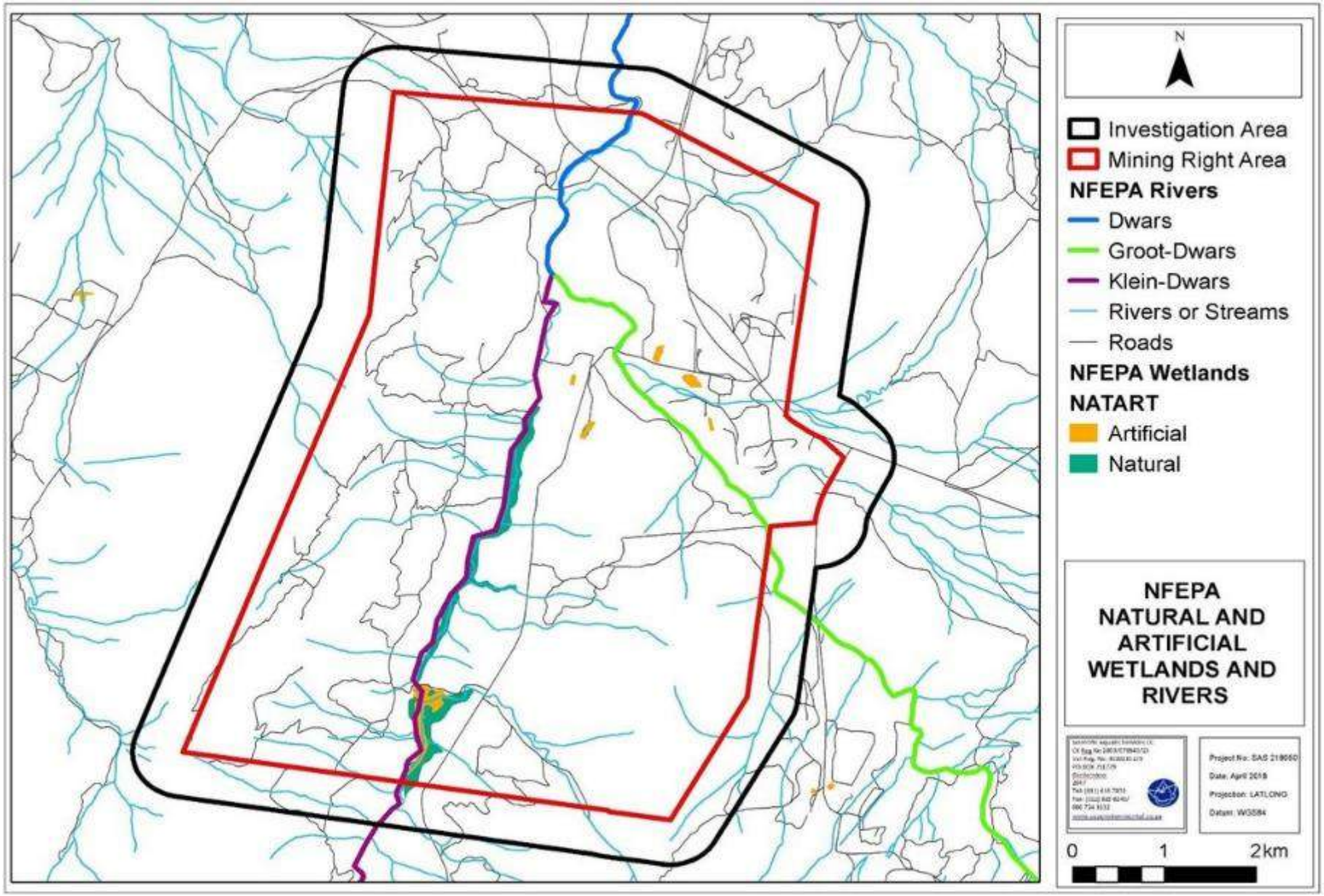


Figure 61: The natural and artificial wetland features and rivers associated with the Mining Right Area, according to NFEPA (2011)

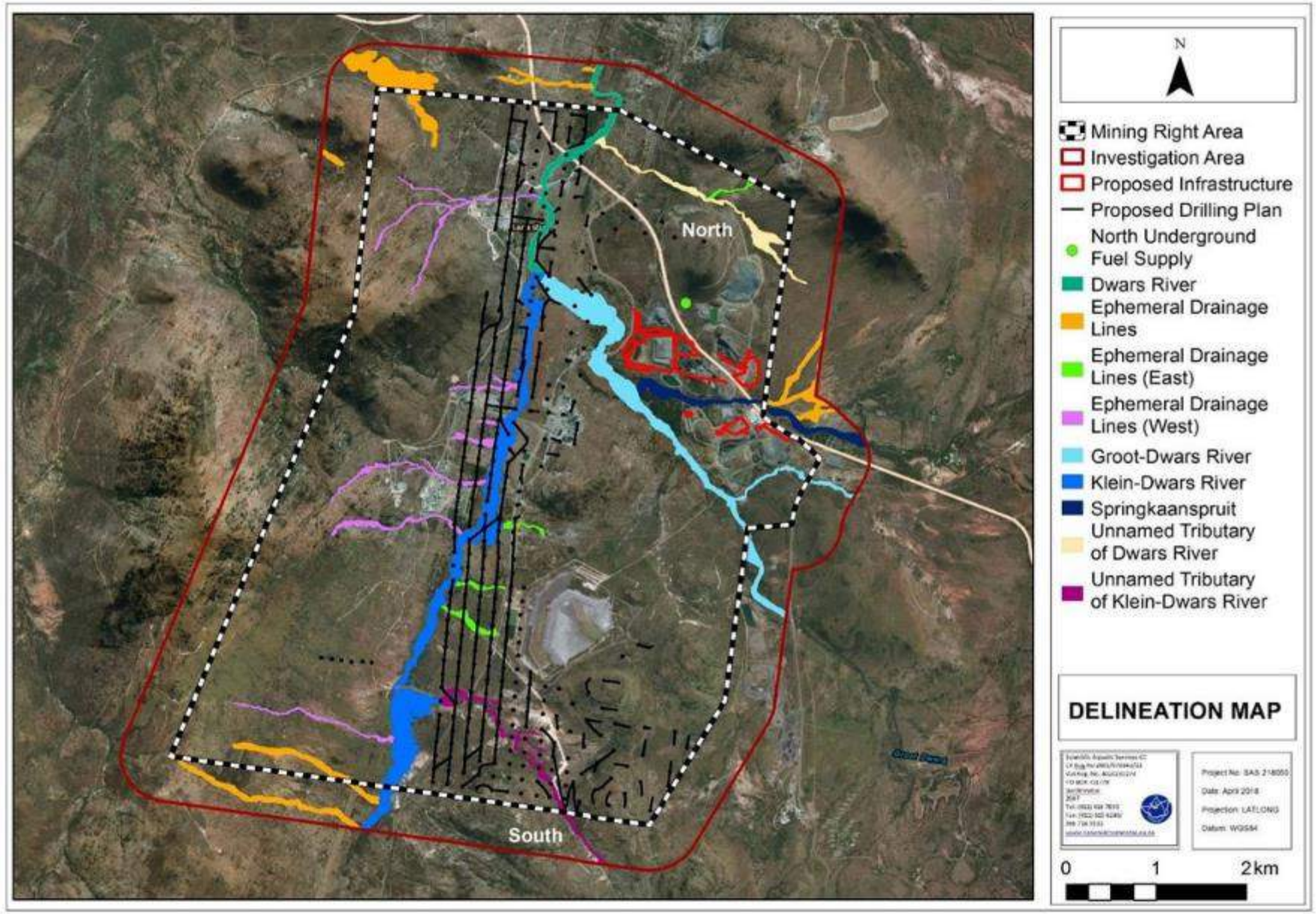


Figure 62: The location of the various drainage systems identified within the Mining Right Area and investigation area, in relation to the proposed drill pads and capital infrastructure

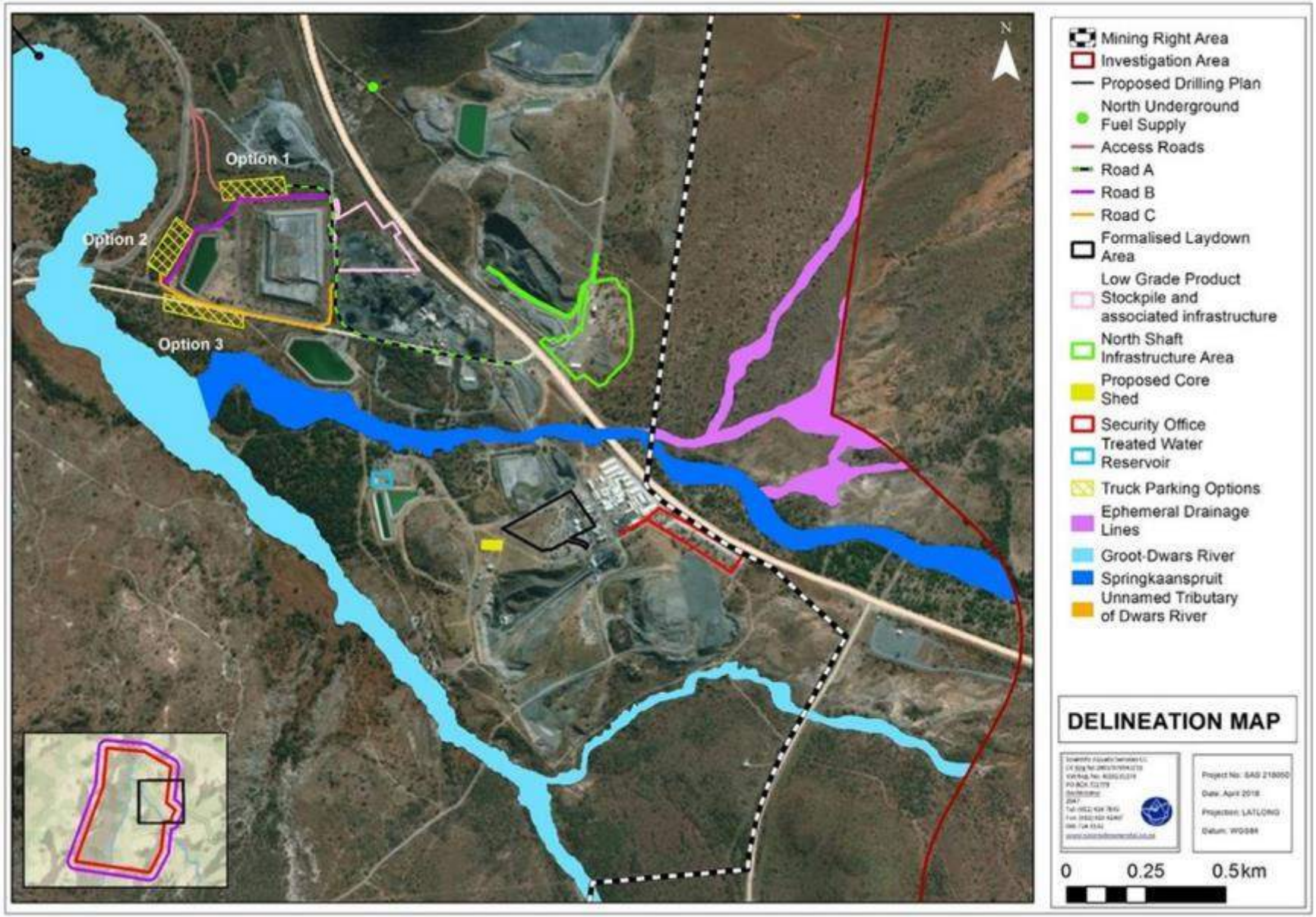


Figure 63: The location of the various drainage systems identified within the Mining Right Area and investigation area, in relation to the proposed capital infrastructure

Table 31: Characterisation of the watercourses associated with the Mining Right Area according to the Classification System (Ollis et. al., *2013)*

Watercourse	Level 3: Landscape unit	Level 4: HGM Type
• Groot Dwarsrivier • Springkaanspruit • Klein Dwarsrivier • Dwars River • Northern and Southern Unnamed tributaries • Western and Eastern Ephemeral Drainage Lines	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes**.**	**River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water.
• Klein Dwarsrivier; and • Lower reaches of: • Groot Dwarsrivier • Springkaanspruit	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes**.**	**Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank.

The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the various resource groups are discussed in the following paragraphs.

Groot Dwarsrivier and Springkaanspruit

PES Category: Instream Index of Habitat Integrity (IHI) PES Category B, Riparian IHI PES Category C

The Groot Dwarsrivier has been subjected to a variety of impacts over several decades, most notably impoundment (i.e. the Der Brochen Dam – also known as the Richmond Dam, located approximately 12km upstream of where the Groot Dwarsrivier enters the Mining Right Area). In addition, channel straightening, weirs, and bridge crossings are present at various points along the river, including within the Dwarsrivier Mine Mining Right Area. These modifications will have an impact on the flow regime, although the Der Brochen Dam and other smaller impoundments will also play a significant role in sediment trapping. Mining activities, including the movement of heavy mining vehicles along gravel roads in the catchment, particularly those which traverse the river, contribute to increased sedimentation of the system. The riparian vegetation community composition remains largely natural, although localised alterations to species composition were also noted within the more disturbed areas (for example, around road crossings). Increased sedimentation and increased nutrient loads are apparent in the floodplain area where the Groot Dwars confluences with the Klein Dwars, as indicated by the monotypic stands of *Phragmites autralis*. The lower reaches of the Springkaanspruit, which enters the Mining Right Area in the north-east, confluencing with the Groot Dwarsrivier in the vicinity of the mine's RWDs have been impacted by road and conveyor crossings, increased sedimentation due to mining activities and altered vegetation communities. However, the upper reaches located outside of the Mining Right Area are unlikely to have been significantly impacted since few disturbances occur in that vicinity.

In Government Gazette Number 39943 issued 22 April 2016, it is indicated that the Klein Dwarsrivier at the confluence with the Groot Dwarsrivier (quaternary catchment B41G), should be maintained at Ecological Category D. For the overall Steelpoort River (quaternary catchment B41K), it is also stated that an Ecological Category D should be maintained. It is thus clear that catchment wide impacts have occurred, and that the system is recognised as being a "working river" (SAS, 2018).

The Groot Dwarsrivier and the Springkaanspruit are considered to provide **intermediate** levels of ecological service provision, although due to the reduced ecological integrity, ecoservice provisioning by the Springkaanspruit is likely to be lower than that of the Groot Dwarsrivier. Both systems are considered important in terms of benefits such as flood attenuation, streamflow regulation, and assimilation of nutrients and toxicants. Whilst the Dwarsrivier Mine Mining Right Area, and other mining properties adjacent to the mine, are largely restricted access areas, when assessing socio-cultural benefits provided by these systems, consideration was given to portions of the rivers which are accessible to local communities. Thus, benefits such as harvestable resources (e.g. fish) and tourism are considered possible, if not directly within the Dwarsrivier Mine property.

EIS Category: **Groot Dwars - Very High**
Springkaanspruit - High

Although the Groot Dwarsrivier has been impacted by various activities such as agriculture and mining, it is nevertheless considered to be ecologically important from the perspective that it provides faunal migratory corridors, breeding and foraging habitat, and contributes to the functioning of downstream systems, as well as

maintenance of key hydraulic processes within the assessment area (such as flood attenuation). Furthermore, as a "working system" it is considered important for the provision of water for economic use.

The Springkaanspruit, having undergone a slightly greater degree of modification, is nevertheless considered important in terms of service provision to downstream systems, as well as from a biodiversity maintenance perspective, however, due to its reduced ecological integrity, is not deemed to be as ecologically important as the Groot Dwarsrivier.

Recommended Ecological Category: Category B/C

Whilst the Government Gazette Number 39943 indicates that an Ecological Category D should be maintained for the Groot Dwars/ Klein Dwars confluence, those sections of the Groot Dwars which remain in a higher ecological category (such as the reach within the Mining Right Area) should nevertheless be maintained as such. Therefore, no further impacts on the section of the Groot Dwarsrivier within the Mining Right Area should be permitted.

The Springkaanspruit too, should be managed and maintained appropriately, i.e. no further impacts should be permitted, and efforts should be made to rehabilitate those areas which have been affected by current mining operations. The Springkaanspruit should be managed as a REC C.

Klein Dwarsrivier

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

The Klein Dwarsrivier comprises both riparian and floodplain wetland areas, however, the floodplain wetland is dominant. Nevertheless, due to the presence of a riparian zone and in order to present comparable results, the IHI method of assessment was applied to ascertain the PES of the system.

Modifiers to the portion of the Klein Dwarsrivier within the Mining Right Area include: altered vegetation profiles (removal of natural vegetation, grazing, and bush encroachment), and increased sediment loads due to erosion in the catchment, trampling by domestic livestock within the floodplain and mining-related disturbances in the catchment. The presence of Richmond Dam also has an effect on geomorphological processes, although it may assist in trapping sediment originating upstream of the Mining Right Area. In addition, hydraulic processes have been modified as a result of impoundment (Richmond Dam) and a bridge crossing (the access road to Two Rivers Platinum Road).

Ecological services provision: intermediate

The Klein Dwarsrivier is considered to provide intermediate levels of various ecological functions, such as sediment trapping, flood attenuation, erosion control and assimilation of nutrients and toxicants. The capacity of the system to provide these services is considered particularly important in the context of the predominant land use within the catchment, especially as mining activities are likely to increase within the general vicinity of the river. In addition, the Klein Dwars is a major tributary of the Dwars River, which in turn is a tributary of the Steelpoort River. Thus, the relative value of the provision of such ecoservices is increased. Potential to provide socio-cultural services, such as harvestable goods and tourism is greatly reduced due to the inaccessibility of the river to local communities. Nonetheless, some socio-cultural value is derived, through an agreement between local communities and the surface rights owners to allow grazing of livestock in the areas adjacent to the river.

The Klein Dwarsrivier is considered to be ecological important due to the provision of faunal habitat and refugia, as well as the potential habitat for threatened species which may occur in the vicinity. Additionally, due to the size (length) of the river, the ecological integrity thereof and relative diversity of habitat types (instream, riparian and floodplain) associated with the river, the system is considered important on a local scale. Furthermore, the Klein Dwarsrivier is deemed to be important for provisioning of hydraulic functions such as flood attenuation, streamflow regulation and the assimilation of nutrients and toxicants.

REC: Category B/C

Further modifications to the system should not be permitted, since the system has already been impacted and is susceptible to further degradation. The placement of drilling pads within the riparian zone, floodplain and instream sections of the river, as indicated by the initial layout provided by the proponent for the purposes of this study, is strongly discouraged and may be construed as a "fatal flaw". For this reason the drilling activities within the flood lines, has been excluded from the project scope.

Dwarsrivier

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

The portion of the Dwars River within the Mining Right Area remains in a largely natural condition, with few modifiers to the system. However, impacts such as weirs and bridge crossings are likely to have had an effect on flow patterns, whilst the riparian zone associated with the reach of the river in the far north of the Mining Right Area has been impacted by removal of vegetation, grazing by livestock and encroachment of both indigenous and alien invasive flora.

Ecological services provision: Moderately High

Ecological service provision by the Dwars River includes flood attenuation, streamflow regulation, assimilation of excess nutrients and toxicants, and sediment trapping. As with the Klein Dwars river, these functions are considered particularly importance in the context of increased development within the river's catchment, and downstream of the Mining Right Area. Such ecological services will provide indirect benefits to downstream users and as such, should be maintained as much as feasible. As with the other systems assessed, potential to provide socio-cultural services is limited by accessibility. However, as noted in the discussion on geomorphology, community utilisation of the northern portion of the system in the Mining Right Area is apparent. Additionally, tourism and educational/ research potential exists, particularly due to the Dwars River Geological Occurrence Heritage Site (declared as such in 1965).

EIS Category: Very High

The Dwars River system is considered to be of very high ecological importance due to the relatively intact ecology of the system and connectivity to surrounding natural areas, thus increasing the likelihood of the occurrence of threatened floral and faunal species. Additionally, the system provides important hydraulic functions, such as flood attenuation and sediment trapping.

REC: Ecological Category B/C

The Dwars River, being relatively ecologically intact, of high ecological importance and sensitivity, and increased cultural/scientific value, should not be permitted to be further degraded as a result of the proposed mining activities. Placement of drill pads within the riparian zone and/or active channel, as indicated by the preliminary layout provided by the proponent, should not be permitted.

Unnamed Tributary North

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

This small, non-perennial unnamed tributary of the Dwars River has likely been impacted in its upper reaches by mining activities outside the north-eastern border of the Mining Right Area (as apparent on digital satellite imagery), and by the presence of roads traversing sections of it. The roads in particular are likely to have an effect on hydraulic connectivity and flow patterns, although as the system is non-perennial, this is unlikely to have a significant effect on biota or on the stream's contribution to downstream ecological processes.

Vegetation in some portions has been disturbed by historical agricultural activities as evidenced by a slight, but discernible, difference in floral composition, and the stream banks have been incised in areas. This is likely to contribute to increased sedimentation during periods of flow.

Ecological services provision: Intermediate

Despite the relatively small size of the system, the ecological integrity thereof increases the potential for the system to provide certain ecological services, such as flood attenuation and sediment trapping (due to largely intact vegetation), and assimilation of nutrients and toxicants. No evidence of use by local communities could be discerned at the time of the assessment, and it is unlikely to be a significant contributor of "goods" (such as harvestable resources) due to its non-perennial nature.

EIS Category: Moderate

Despite the relatively small size of the system, it is nevertheless considered to be moderately ecologically important in terms of biodiversity maintenance. Since few disturbances occur in the immediate vicinity thereof, with the exception of mining activities on the far north-eastern boundary of the Mining Right Area, it is conceivable that suitable habitat may be found for threatened, or more sensitive, floral and/or faunal species. In addition, since the system is non-perennial, increased flood peaks could have an impact on the composition of, and utilisation by, biota.

REC: Category B/C

Since the system is considered to be in a largely natural condition, management measures should be aimed at retaining the current condition. According to the preliminary layouts provided by the proponent, no drilling pads

or capital projects are planned for the area surrounding this system, and wherever feasible, it is recommended that the system remain unimpacted and protected from future development.

Unnamed Tributary South

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

This unnamed, non-perennial tributary of the Klein Dwarsrivier remains in a largely natural condition, although some changes to the non-marginal riparian vegetation (primarily due to grazing by domestic livestock and wildlife) are evident and there is notable erosion in the catchment, primarily in the headwaters of the system. The minimal road crossings may have some effect on flow patterns during flow periods, although this impact is likely to be negligible, given the non-perennial nature of the system. Sediment inputs are likely to be equal to or marginally higher than under undisturbed, natural conditions. Some streambank incision was noted; this may be largely natural due to the dispersive nature of the soils, however it is likely to be exacerbated by trampling by livestock.

Ecological services provision: Intermediate

In spite of the non-perennial nature of the tributary, it is still considered to have potential to provision certain ecological services, although the capacity to do so may be reduced. Riparian vegetation cover is relatively intact in most portions of the system, therefore there is some capacity to provide – for example – sediment trapping and flood attenuation services. Potential to provide socio-cultural services is increased due to the remote location of the system, but that potential is counter-balanced by the non-perennial nature thereof, thereby limiting the extent to which the local community could rely on it.

EIS Category: Moderate

Although in a relatively unmodified ecological condition, dependence on, and utilisation by fauna is likely to be reduced due to the non-perennial nature of this system. Therefore, ecological importance in terms of biodiversity maintenance and hydrological functions is considered to be moderate. However, the system may be sensitive to increased flood peaks (e.g. increased incidence of hydrophytic vegetation within the marginal zone).

REC: Category B/C

Although not deemed to be of high EIS, the system is nevertheless considered to be relatively ecologically intact and should therefore be managed as such. The initial layout provided by the proponent indicates several drill pads located within the active channel and riparian zone of the system, which will have unacceptably high impacts on the system.

Ephemeral Drainage Lines West

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

As it was not possible to gain access to these drainage lines during the site assessment due to access constraints relating to Two Rivers Platinum Mine's active mining operations, these systems were largely assessed on a desktop basis with limited field verification. The headwaters of these systems remain in a relatively natural condition, with vegetation likely to be intact and representative of the natural vegetation of the area, however, the lower reaches, located close to mining operations, have been impacted by vegetation removal, construction of road crossings, and catchment hardening.

Ecological services provision: Intermediate

Although limited in extent, and ephemeral in nature, these drainage lines are nevertheless considered important in the provision of certain ecological services such as flood attenuation, sediment trapping, erosion control and nutrient and toxicant assimilation. However, potential for socio-cultural benefits is limited due to accessibility.

EIS Category: High

Despite their limited extent, the western ephemeral drainage lines are deemed to be of high ecological importance primarily due to the ecological integrity of the headwaters of the systems. These areas are likely to provide important habitat and refugia for a number of faunal species, as well as threatened floral species.

REC: Category B/C

Since the lower reaches of these systems have already undergone moderate alterations and are subjected to ongoing impacts, these systems should be conserved and protected as much as feasible, particularly the

headwaters/upper reaches of the systems. Thus, it is preferable that no further activities be permitted within any of these ephemeral drainage lines.

Ephemeral Drainage Lines East

PES Category: Instream IHI PES Category B, Riparian IHI PES Category C

Whilst the results of the IHI assessment indicate that these systems are in a largely natural to moderately modified ecological condition, it is the opinion of the ecologists that a PES C (moderately modified) category is a more accurate representation of the condition of these systems. Unlike those on the western side of the Mining Right Area, these systems have been impacted to a greater extent by mining activities. Modifiers include loss of catchment yield due to placement of infrastructure close to the headwaters of some systems, road and pipeline crossings, removal of vegetation, and erosion in the catchment (in turn contributing to increased sedimentation of the systems). Whilst loss of catchment yield may have occurred, increased water inputs are anticipated due to catchment hardening, and the increased velocity of such inputs (due to lack of vegetation to slow flow) may have contributed to bank incision and altered channel competency.

Ecological services provision: Intermediate

Although the capacity of these systems to provide ecological services is limited by their relatively small size and ecological integrity, they nevertheless provide intermediate levels of services such as flood attenuation, assimilation of nutrient and toxicants, and erosion control. Potential to provide socio-cultural services is reduced due to accessibility (most are enclosed within fenced-off areas) and intermittent flow patterns.

EIS Category: Moderate

Due to the reduced ecological integrity, the ecological importance of these systems is reduced, although they are still deemed important on a local scale for biodiversity maintenance and provision of hydrological functions. They are likely to be sensitive to increased or altered flood peaks which may have an effect on floral species composition and community structure (e.g. increase in hydrophytic vegetation).

REC: Category C

As far as possible, no further impacts to these systems should be permitted. Whilst the initial layout provided by the proponent indicates that no infrastructure or drill pads are planned directly within any of the eastern ephemeral drainage lines, some drill pads are placed in close proximity (within 15m) thereof. It is strongly recommended that the placement of these be reconsidered and moved further away from the drainage lines, and that strict mitigation measures are implemented throughout all phases of drilling, particularly if the placement cannot be revised.

Please refer to Figure 64 and Figure 65.

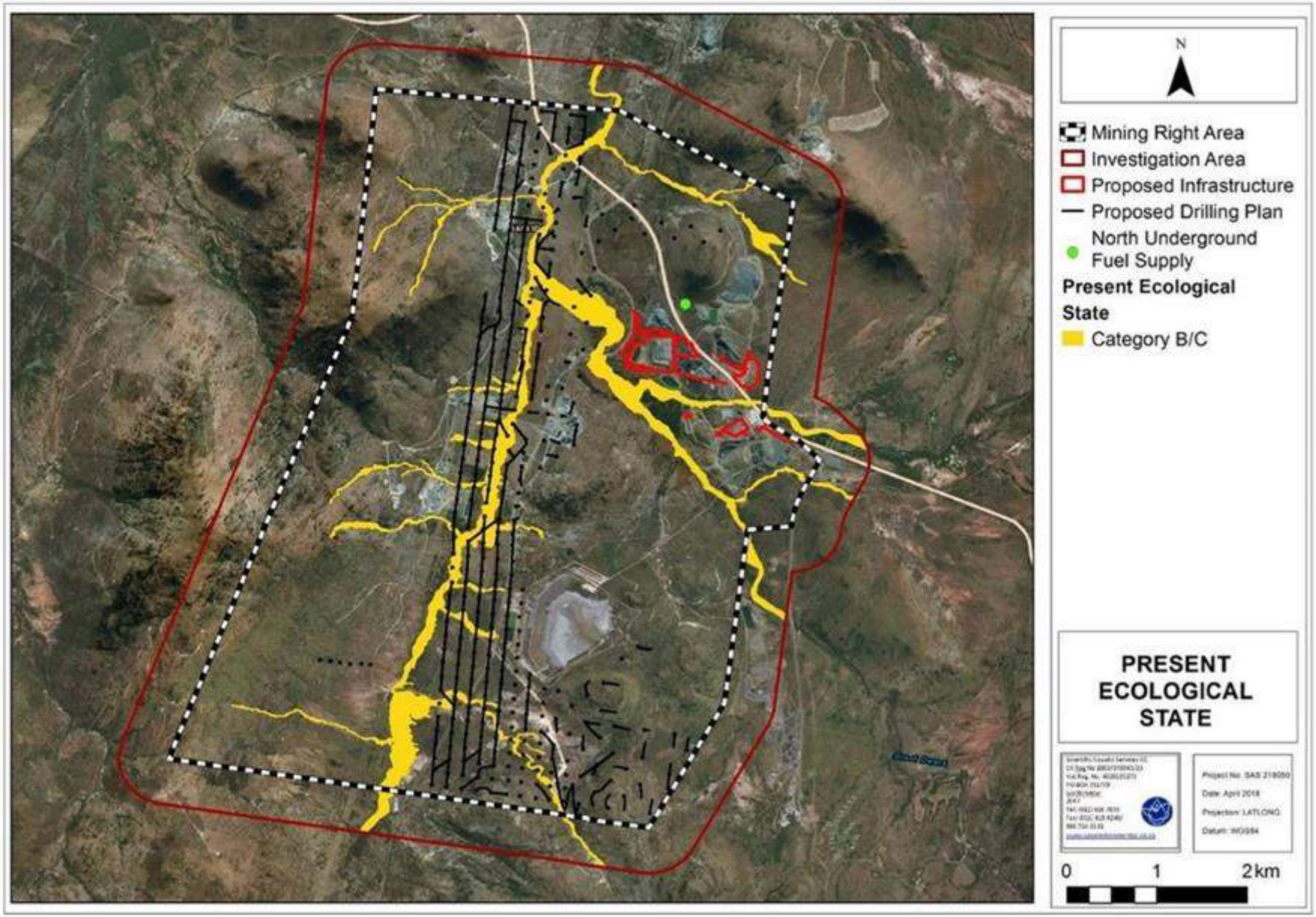


Figure 64: Conceptual presentation of the Present Ecological State (PES) categories applicable to the assessed freshwater resources

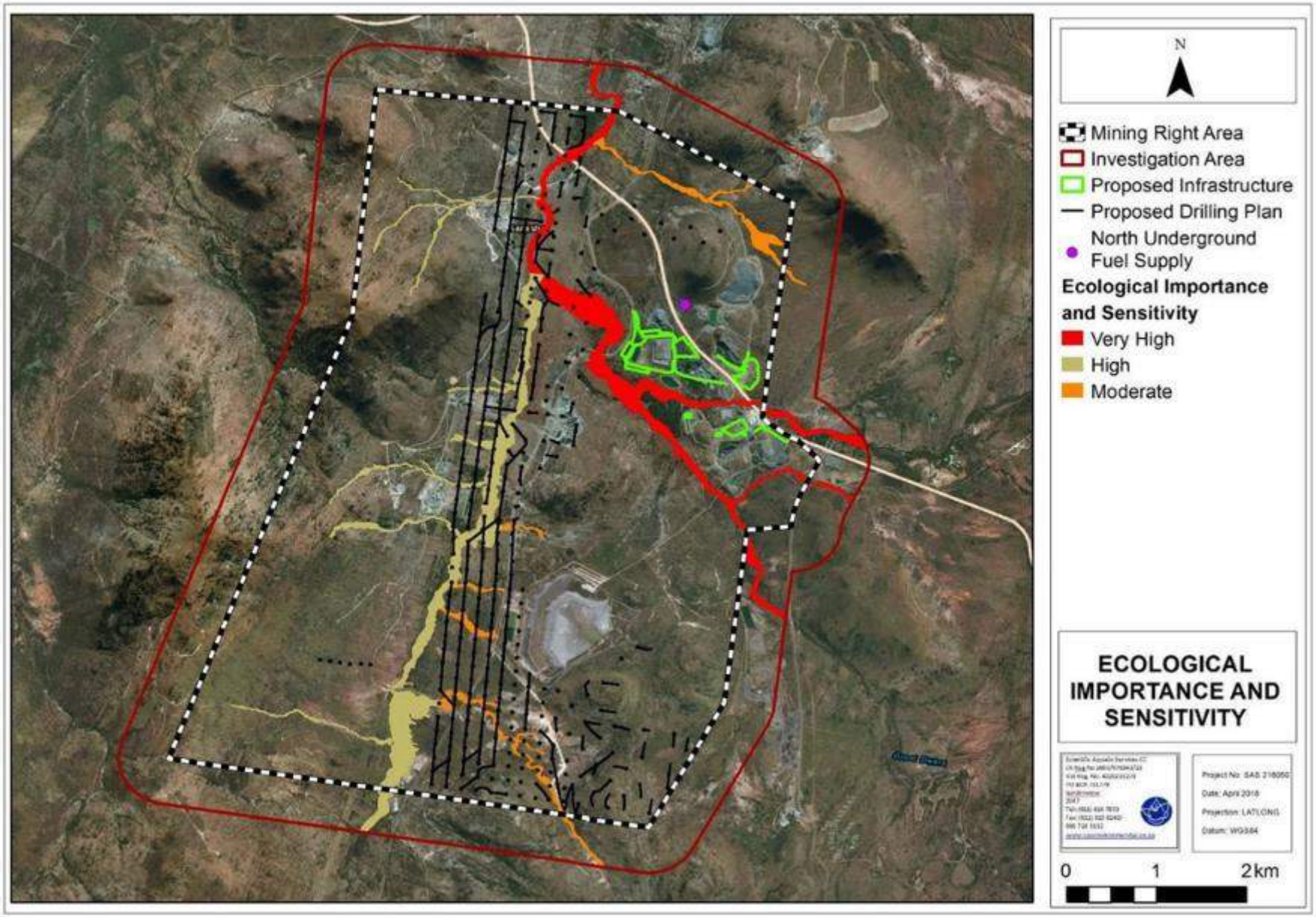


Figure 65: Conceptual presentation of the Ecological Importance and Sensitivity (EIS) of the assessed freshwater resources

1.g.iv.1.i.3 Aquatic Ecological Assessment

The period of biomonitoring data used ranged from August 2002 to May 2018.

Table 32: Site S1 (Located downstream of the Everest, Der Brochen, Mototolo, Helena and Thorncliffe mines. Except for mining activities, there is little activity in the catchment. The site is also located downstream of the Der Brochen Dam at which flow in the system is controlled)

***In situ* physico-chemical water quality**				**Aquatic macro-invertebrate community integrity**	
pH	8.08	OREWRA (2001)		**Invertebrate community assessment (SASS5 and IHAS)**	
EC (mS/m)	43.0	pH	7 – 8.5	**SASS5 score**	77
DO (mg/L)	7.51	EC (mS/m)	45 – 80	**Number of taxa**	15
DO (% sat)	87.6	DO (mg/L)	> 80 %	**ASPT score**	5.1
Temp (C)	17.4			**IHAS score**	65 (Good)
				MIRAI score	55.0 (Category D. Largely Modified)

Site specific temporal water quality variations (% var.)			**Site specific temporal aquatic invertebrate community variations (% var.)**			
Parameter	**% Var. from initial assessment (Aug 2002)**	**% Var. from previous season (May 2017)**	**Parameter**	**% Var. from ref ecoregion data**	**% Var. from initial assessment (Aug 2002)**	**% Var. from previous season (May 2017)**
pH*	**-15.8**	+0.6	**SASS5**	**-62.4**	**-36.4**	-1.3
EC (mS/m)	**+82.2**	+13.2	**ASPT**	**-27.1**	-12.1	-8.9
DO (mg/L)**	**-21.8**	**-22**	**IHAS**	NA	+3.2	**-15.6**
Key:	Negative value = decrease; Positive value = increase. Normal text = no significant change; **Bold text = significant change (compared to guideline).** **Red text = significant deterioration;** **Blue text = significant improvement.**		**Key:** Negative value = decrease; Positive value = increase. **A deterioration exceeding 15% was considered significant.** **An increase exceeding 15% was considered significant.**			

Site specific spatial water quality variations (% var.)		**Site specific spatial aquatic invertebrate community variations (% var.)**	
Parameter	**% Variation from upstream spatial reference**	**Parameter**	**% Variation from upstream spatial reference**
pH **EC (mS/m)** **DO (mg/l)** **Temp (C)**	NA (No upstream spatial reference)	**SASS5** **ASPT** **IHAS**	NA (No upstream spatial reference)
Dallas (2007) **MIRAI**		**Category E/F** **Category D**	

In terms of the quality:

- When compared to the initial assessment (August 2002), the SASS5 score has decreased by 36.4% and the ASPT score by 12.1%. A 3.2% increase in habitat suitability is evident at the time of the assessment (Table 2 of the Freshwater and Aquatic Assessment - Annexure 6). The long-term decrease in SASS5 (measure of diversity) and ASPT (measure of sensitivity) scores could thus be attributed to catchment wide impacts prior to any impact from the Dwarsrivier Mine;
- In comparison to the previous season assessment (May 2017), the SASS5 score has decreased by 1.3% and the ASPT score by 8.9% (Table 2 of the Freshwater and Aquatic Assessment - Annexure 6), along with a 15.6% decrease in habitat suitability when compared to the previous season. Decrease in SASS5 and ASPT scores could potentially be attributed to short term decrease in habitat suitability, compounded by the bridge construction and rehabilitation activities at the site;
- Overall, the SASS5 and Invertebrate Habitat Assessment System (IHAS) scores are slightly variable and often dependant on seasonality. However, the SASS5 and IHAS scores generally follow the same trend over time. Close monitoring of emerging longer-term trends is considered essential;
- Over the long term, macro-invertebrate habitat suitability can be considered as adequate or highly suited and stable over time. Lack of strong flow and flow variability are considered significant natural ecological drivers, which shapes the aquatic community present in the system;
- In conclusion: Long term trends at this site are potentially influenced by catchment-wide sources of contamination. However, short term trends are likely as a result of the bridge construction and rehabilitation activities at site S1, compounded by flow variability within the system. The latter (short-term) trends need to be closely monitored in future once the construction and rehabilitation activities have been completed.

Table 33: Site S2 (Located downstream of the mine on the Groot Dwarsrivier. The site is located downstream of the potential area of impact from the mine)

***In situ* physico-chemical water quality**				**Aquatic macro-invertebrate community integrity**	
pH	8.50	OREWRA (2001)		**Invertebrate community assessment (SASS5 and IHAS)**	
EC (mS/m)	49.0	pH	7 – 8.5	**SASS5 score**	91
DO (mg/L)	8.20	EC (mS/m)	45 – 80	**Number of taxa**	15
DO (% sat)	94.5	DO (mg/L)	> 80 %	**ASPT score**	6.1
Temp (C)	16.9			**IHAS score**	72 (Good)
				MIRAI score	58.2 (Category D. Largely Modified)

Site specific temporal water quality variations (% var.)			**Site specific temporal aquatic invertebrate community variations (% var.)**			
Parameter	**% Var. from initial assessment (Aug 2002)**	**% Var. from previous season (May 2017)**	**Parameter**	**% Var. from ref ecoregion data**	**% Var. from initial assessment (Aug 2002)**	**% Var. from previous season (May 2017)**
EC (mS/m)	**+9.0**	0	**SASS5**	**-55.6**	+8.1	-7.1
pH*	**+131.1**	**+8.9**	**ASPT**	-12.9	+7.7	-6.2
DO (mg/L)**	**-16.3**	-7.7	**IHAS**	NA	-7.5	-6.5
Key:	Negative value = decrease; Positive value = increase. Normal text = no significant change; **Bold text = significant change (compared to guideline).** **Red text = significant deterioration;** **Blue text = significant improvement.**		**Key:** Negative value = decrease; Positive value = increase. **A deterioration exceeding 15% was considered significant.** **An increase exceeding 15% was considered significant.**			

Site specific spatial water quality variations (% var.)		**Site specific spatial aquatic invertebrate community variations (% var.)**	
Parameter	**% Variation from upstream spatial reference**	**Parameter**	**% Variation from upstream spatial reference**
pH	**+5.2**	**SASS5**	**+18.2**
EC (mS/m)	+14.0	**ASPT**	+10.8
DO (mg/l)	+9.2	**IHAS**	**+19.6**
Dallas (2007)		**Category D**	
MIRAI		**Category D**	

In terms of quality:

- When compared to the initial assessment (August 2002), the SASS5 score has increased by 8.1% and the ASPT score by 7.7%. A 7.5% decrease in habitat suitability is evident at the time of the assessment (Table 5 of the Freshwater and Aquatic Assessment - Annexure 6). The results suggest that water quality at this point may be a more important long-term ecological driver in the system, compared to habitat suitability. However, lack of fast flowing water and flow variability likely also contributed to the long-term variability in SASS5 score;
- In comparison to the previous season assessment (May 2017), the SASS5 score has decreased by 7.1% and the ASPT score by 6.2% (Table 5 of the Freshwater and Aquatic Assessment - Annexure 6), along with a 6.5% decrease in habitat suitability when compared to the previous season. Decrease in SASS5 and ASPT scores could potentially be attributed to the short-term decrease in habitat suitability at the time of the assessment;
- Overall, the SASS5 and IHAS scores are slightly variable and often dependant on seasonality. However, the SASS5 and IHAS scores generally follow the same long-term trend and can be considered as decreasing (slight in the case of habitat and very significant in the case of the aquatic macro-invertebrate community integrity) over time;
- Over the long term, macro-invertebrate habitat suitability can be considered as adequate or highly suited and stable over time;
- In conclusion: Long term and short-term trends could potentially be attributed to catchment wide contamination, long-term decreases in habitat suitability and natural variations in flow, potentially compounded by the Dwarsrivier Mine activities. However, spatial comparison (see Table 8 of the Freshwater and Aquatic Assessment - Annexure 6) suggests that any significant impact from Dwarsrivier Mine activities at the time of assessment was unlikely.

In terms of the Riparian Vegetation Response Assessment Index (VEGRAI) and Fish Response Assessment Index (FRAI), the following was concluded:

- Application of the VEGRAI tool applied in May 2018 yielded the following result:

LEVEL 3 ASSESSMENT

METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT
MARGINAL	69.6	38.7	3.3	1.0	100.0
NON MARGINAL	73.3	32.6	3.3	2.0	80.0
	2.0				180.0
LEVEL 3 VEGRAI (%)				71.3	
VEGRAI EC				**C**	
AVERAGE CONFIDENCE				3.3	

Fish species expected to occur in the system were presented in Section 3.2 of the aquatic assessment contained in Annexure 6. Specific mention must be made of the potential presence of two Near Threatened fish taxa in this section of the Groot Dwarsrivier: *Enteromius motebensis 1 & 2,* and *Oreochromis mossambicus 3*.

The following fish species were collected or observed during the biomonitoring assessment performed:

- *Enteromius trimaculatus;*
- *Enteromius unitaeniatus;*
- *Chiloglanis pretoriae;*
- *Labeobarbus marequensis*; and
- *Tilapia sparrmanii.*

Application of the FRAI tool yielded the following result:

FRAI (%)	66.6
FRAI EC	**C**

The Ecostatus Category for the FRAI classification complies with the Resource Quality Objectives (RQOs) of the Olifants River catchment (DWS, 2016).

The summary in terms of the Ecostatus data comparison is presented in the following table:

Table 34: Ecostatus Data Comparison

Ecostatus desktop assessment data summary				**Biomonitoring assessment results summary**		
Criteria	**Kleynhans 1999**	**DWS RQIS database**	**Olifants Resource Quality Objectives (DWS 2016)**	**Criteria**	**Ecological Category classification achieved for the following sites as well as overall rating for the Groot Dwarsrivier:**	
					S1	**S2**
Applicable catchment/sub-quaternary catchment	**B41G**	**B418-00674**	**B41G**	**SASS5**	**E/F**	**D**
EIS	**High**	-	-	**MIRAI**	**D**	**D**
Mean EI class	-	**High**	-			
Mean ES class	-	**Very High**	-	**Instream IHI**	**B**	**B**
PEMC	**Class B: Largely natural**	-	-			
PES	-	**D (Largely modified)**	-	**Riparian IHI**	**C**	**C**
DEMC	**Class B: Sensitive system**	-	-			
Default EC	-	**A**	-	**FRAI**	**C**	**C**
REC	-		**C*** **D****	**VEGRAI**	**C**	**C**
Ecological Integration Tool result* **					**66.12 (C)**	**66.9 (C)**

EIS = Ecological Importance and Sensitivity; PEMC = Present Ecological Management Class; DEMC = Desired Ecological Management Class; PES = Present Ecological State; confirmed in database that assessments were performed by expert assessors; EI = Ecological Importance; ES = Ecological Sensitivity; EC = Ecological Category; default based on median PES and highest of EI or ES means; REC = Recommended Ecological Category
** Upper reaches of Groot Dwarsrivier before mining impact;*
*** Klein Dwarsrivier at the confluence with the Groot Dwarsrivier, also the REC for the Steelpoort River in this catchment of the Olifants River. Corresponds with PES of the Groot Dwars as per DWS RQIS database.*
**** The mean MIRAI score for sites GD2 to GD5 (56.0), as well as the FRAI (49.3) and VEGRAI (73.3) scores calculated for the Groot Dwarsrivier, was employed in this*

1.g.iv.1.i.4 Ecological Importance and Sensitivity (EIS) Assessment

The EIS method (DWAF, 1999) was applied to the Groot Dwars, Klein Dwars and Dwars Rivers in order to ascertain the current sensitivity and importance of the system. The results of the assessment are presented in the table below:

Table 35: Results of the EIS assessment for the Groot Dwars, Klein Dwars and Dwars Rivers within the study area.

Biotic Determinants	Groot Dwars	Klein Dwars	Dwars
Rare and endangered biota	3	3	3
Unique biota	3	2	3
Intolerant biota	3	3	3
Species/taxon richness	2	2	2
Aquatic Habitat Determinants	-	-	-
Diversity of aquatic habitat types or features	3	3	3
Refuge value of habitat type	3	3	3
Sensitivity of habitat to flow changes	3	3	3
Sensitivity of flow-related water quality changes	3	3	3
Migration route/corridor for instream and riparian biota	2	2	1
Nature Reserves, Natural Heritage sites, Natural areas, PNEs	1	1	2
RATINGS	**2.6**	**2.5**	**2.6**
EIS CATEGORY	**High**	**High**	**High**

The EIS analysis of the three primary river systems in the Mining Right Area provided scores of between 2.5 and 2.6, which are regarded as **important and sensitive**. Quaternaries/ delineations that obtain this score are considered to be unique on a national scale based on their biodiversity. These rivers (in terms of biota and habitat) may be sensitive to flow modifications.

The high importance and sensitivity of the river is mainly as a result of the presence of the unique biota known to occur in the area based on available databases (DWS Resource Quality Information Service (RQIS) PES/EIS database). Fish taxa known to be sensitive (high water quality and pristine habitat requirements) include *Amphilius uranoscopus, Labeobarbus marequensis* and *Chiloglanis pretoriae.* In addition, two Near Threatened red data list fish species, according to the IUCN occur in the area based on desktop assessments, namely *Enteromius motebensis* and *Oreochromis mossambicus*.

Sensitive (intolerant) invertebrate taxa that may potentially occur in the area based on desktop assessment include Athericidae, Chlorocyphidae, Heptageniidae, Perlidae, Philopotamidae and Psephenidae. The presence of sensitive/ intolerant biota, diversity of aquatic habitat types as well as the sensitivity of the habitat to flow changes, added to the high importance and sensitivity rating.

1.g.iv.1.j Air Quality

The general sources of potential air emissions and/or pollution significance for Dwarsrivier Mine are:

- Transfer of ore from underground to Run of Mine stockpiles by belt conveyor (wind entrained particulate matter);
- Vehicle exhaust gasses – both on and off site;
- Dust generated from vehicles driving on unpaved roads within mine boundary;
- Stockpiling of product stockpiles; and
- The potential future clearance activities.

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

Table 36: 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 Storage Facility South Shaft
DWR 005	North Shaft

The following figure illustrates the location of these:

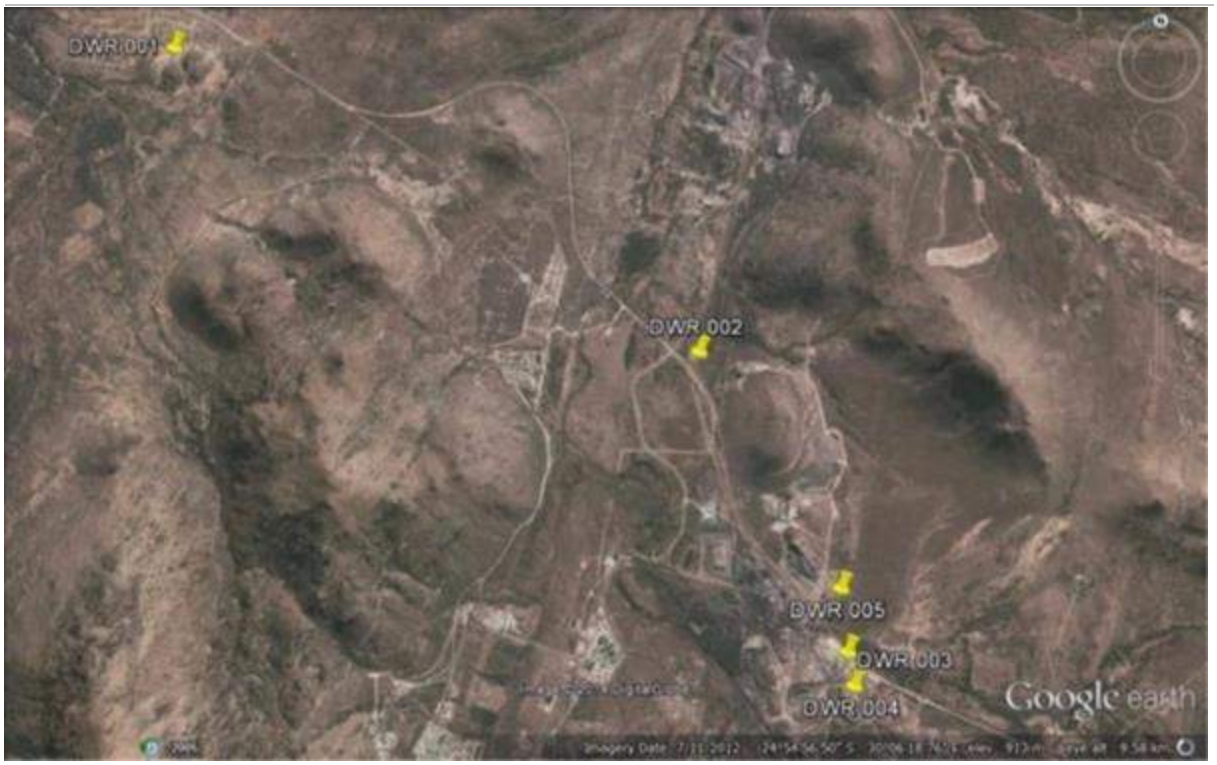


Figure 66: Dust Monitoring Locations

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

No additional air quality 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. It is not foreseen that the projects in question would have any significant impact on ambient dust fall out.

1.g.iv.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. The drilling activities will be located within an areas characterised by large scale mining activities.

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.g.iv.1.l Cultural and Heritage Setting

A site visit was conducted by HAC on 26 and 27 June 2018. The following figure indicates the areas assessed.

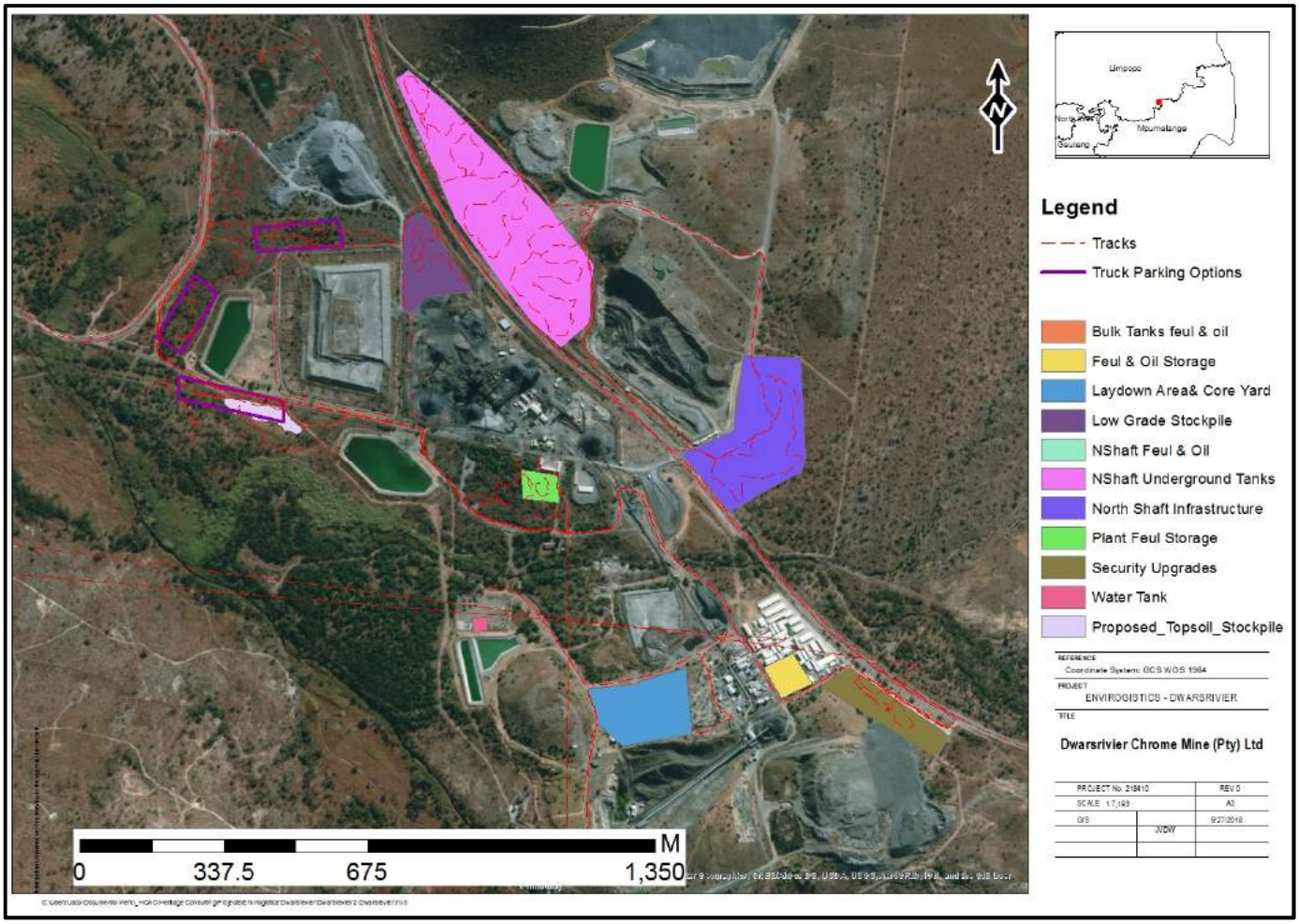


Figure 67: Track logs of survey in red

1.g.iv.1.l.1 Literature review

In anticipation of other mining activities in the greater study area, archaeologists have completed numerous heritage surveys including Huffman & Schoeman 2001, 2002a and b; van Schalkwyk 2005; Roodt 2003a, 2003b, 2003c, 2005, 2008a, 2008b; Van der Walt & Fourie 2006; Van der Walt & Celliers 2009; Van der Walt 2009; 2016, 2017 and Pistorius 2007, 2010, 2011 as well as Van Vollenhoven and Pelser 2001, 2002 and Van Vollenhoven 2012 and 2013 for various EIAs and EMPr's). These studies provide a good understanding of the archaeology of the area and use of the wider landscape. Since 2001, heritage surveys have recorded more than 240 sites in the greater study area, ranging from the Middle Stone Age to the recent households of farm labourers.

The distribution of the sites on the landscape show different land use patterns. Many agriculturally-orientated societies (making Eiland, Leolo and Marateng pottery) built their villages in the valleys near cultivatable alluvium. Others (probably Ndebele) built terraced-settlements on basal slopes of the valley edge, while farm labourers usually lived in the valleys as well. During the 19th Century, farmers lived around the edge of high meadows as a measure of protection. A few Middle Iron Age Eiland sites were also cited in this plateau environment.

No known grave sites are indicated in the study area however grave sites can be expected anywhere on the landscape and several grave sites have been recorded (e.g., Van Vollenhoven & Pelser 2001) in the project area.

Please refer to Annexure 6 for the general history of the area.

1.g.iv.1.l.2 Cultural Landscape

The site under investigation is located about 14km southwest of Steelpoort, and about 13km east of the R555 Main Road in Limpopo Province in an area that is extensively mined. The greater area has been extensively disturbed by previous developments and the proposed projects are in line with the land use in the surrounding area.

1.g.iv.1.l.3 Identified Sites

A primarily desktop-based heritage study supplemented by a brief field visit was conducted for Project 1 as the area of Dwarsrivier has been assessed in the past. Previous surveys (Van Vollenhoven & Pelser 2001, 2002, Steggman & Roodt 2012 as well as Van Vollenhoven 2012 and 2013) conducted for this area recorded 21 sites ranging from ruins, mine adits, graves to Iron Age and Stone Age sites (table below). The recorded sites are mostly located in areas not previously impacted on by the existing mining operations in the area (following two figures). In addition a National Monument were recorded and 3 clusters of buildings from 1: 50 000 maps (following two figures).

Table 37: Known sites

Site no.	Type Site	Co-Ordinate	Author
MH 1	Dwellings	S24° 56’ 02.4” E30° 05’ 37.2”	Stegmann & Roodt (2012)
MH 2	Masha Settlement	S24° 56’ 12.0” E30° 05’ 25.9”	Stegmann & Roodt (2012)
NSH1	Historical Adit	S24° 54’ 57.4” E30° 05’ 35.4”	Stegmann & Roodt (2012)
SIA 1	Eiland Iron Age Site	S24° 57’ 58.3” E30° 05’ 52.9”	Stegmann & Roodt (2012)
SIA 2	Possible Marateng Site	S24° 58’ 08.5” E30° 05’ 53.8”	Stegmann & Roodt (2012)
MIA 1	Possible Marateng Site	S24° 56’ 12.0” E30° 05’ 25.9”	Stegmann & Roodt (2012)
MG 1	Graves	S24° 56’ 14.1” E30° 05’ 33.1”	Stegmann & Roodt (2012)
MG 2	Graves	S24° 56’ 14.0” E30° 05’ 32.2”	Stegmann & Roodt (2012)
MG 3	Graves	S24° 56’ 08.1” E30° 05’ 34.0”	Stegmann & Roodt (2012)
01/1	Iron Age Site	S24° 57’ 01” E30° 05’ 27”	Van Vollenhoven & Pelser (2001)
01/2	Iron Age	S24° 57’ 09” E30° 06’ 17”	Van Vollenhoven & Pelser (2001)
01/3	Graves	S24° 56’ 58” E30° 06’ 08”	Van Vollenhoven & Pelser (2001)
01/4	Historical Dwelling	S24° 56’ 54” E30° 06’ 08”	Van Vollenhoven & Pelser (2001)
01/5	Farm Labourer Dwelling	S24° 57’08” E30° 06’ 39”	Van Vollenhoven & Pelser (2001)
01/6	Graves	S24° 57’ 09” E30° 06’ 17”	Van Vollenhoven & Pelser (2001)
01/7	Graves	S24° 57’ 02” E30° 06’ 20”	Van Vollenhoven & Pelser (2001)
01/8	Graves	S24° 57’ 07” E30° 06’ 26”	Van Vollenhoven & Pelser (2001)
01/9	Graves	S24° 57’ 02” E30° 06’ 12”	Van Vollenhoven & Pelser (2001)
01/10	Graves	S24° 56’ 50” E30° 06’ 05”	Van Vollenhoven & Pelser (2001)
02/1	Stone Age	S24° 57’ 00” E30° 05’ 20”	Van Vollenhoven & Pelser (2002)
02/2	Iron Age	S24° 57’ 06” E30° 05’ 20”	Van Vollenhoven & Pelser (2002)

Table 38: Newly recorded sites

Site name.	Type Site	Co-Ordinate	Source
National Monument	Geological	S24° 54' 36.4754" E30° 06' 11.4287"	HCAC 2018
Sarashof	Farmhouse	S24° 54' 35.3477" E30° 06' 06.4004"	1:50 000 topographical map
Dwarsrivier 1	Possibly Farmhouse and outbuilding	S24° 55' 02.5012" E30° 05' 58.9384"	1:50 000 topographical map
Dwarsrivier 2	Possibly Farmhouse and outbuilding	S24° 55' 43.0380" E0° 06' 21.3071"	1:50 000 topographical map

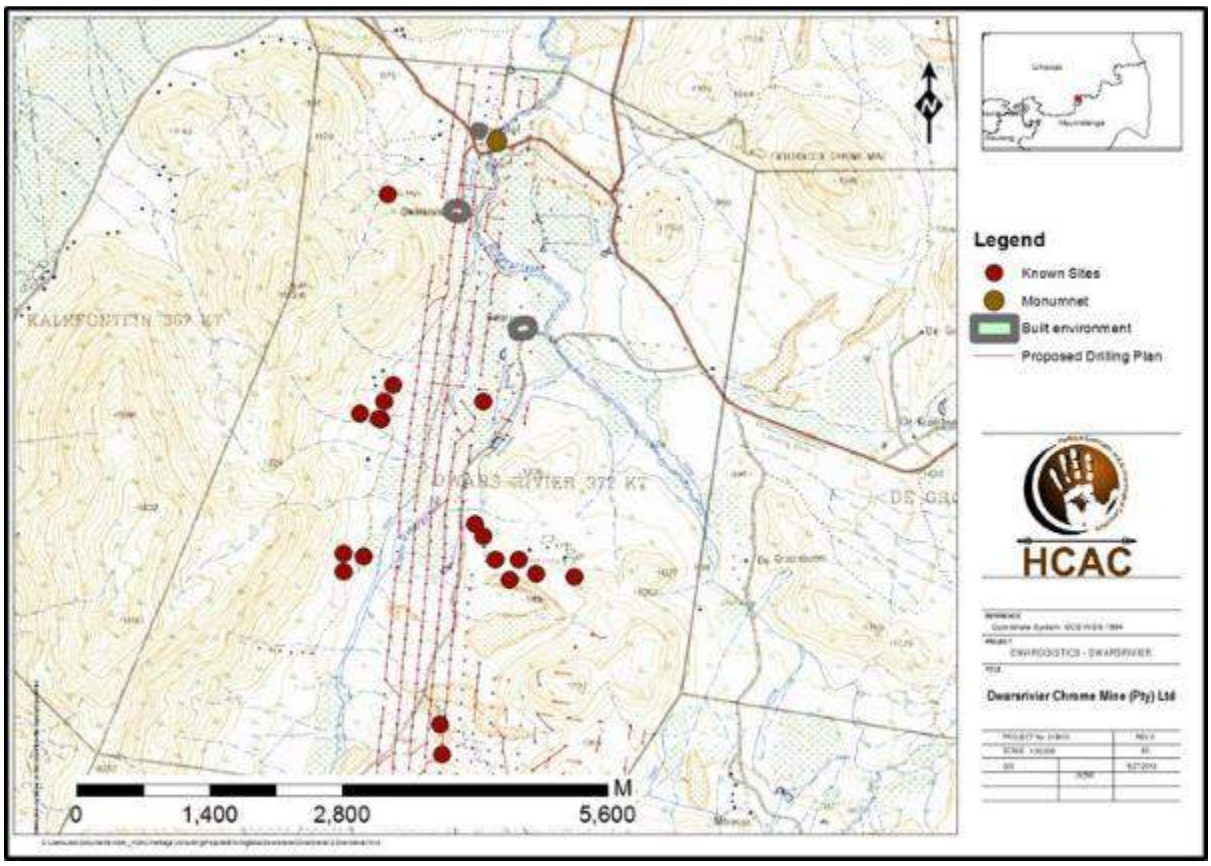


Figure 68: Site distribution in relation to the proposed drilling plan.

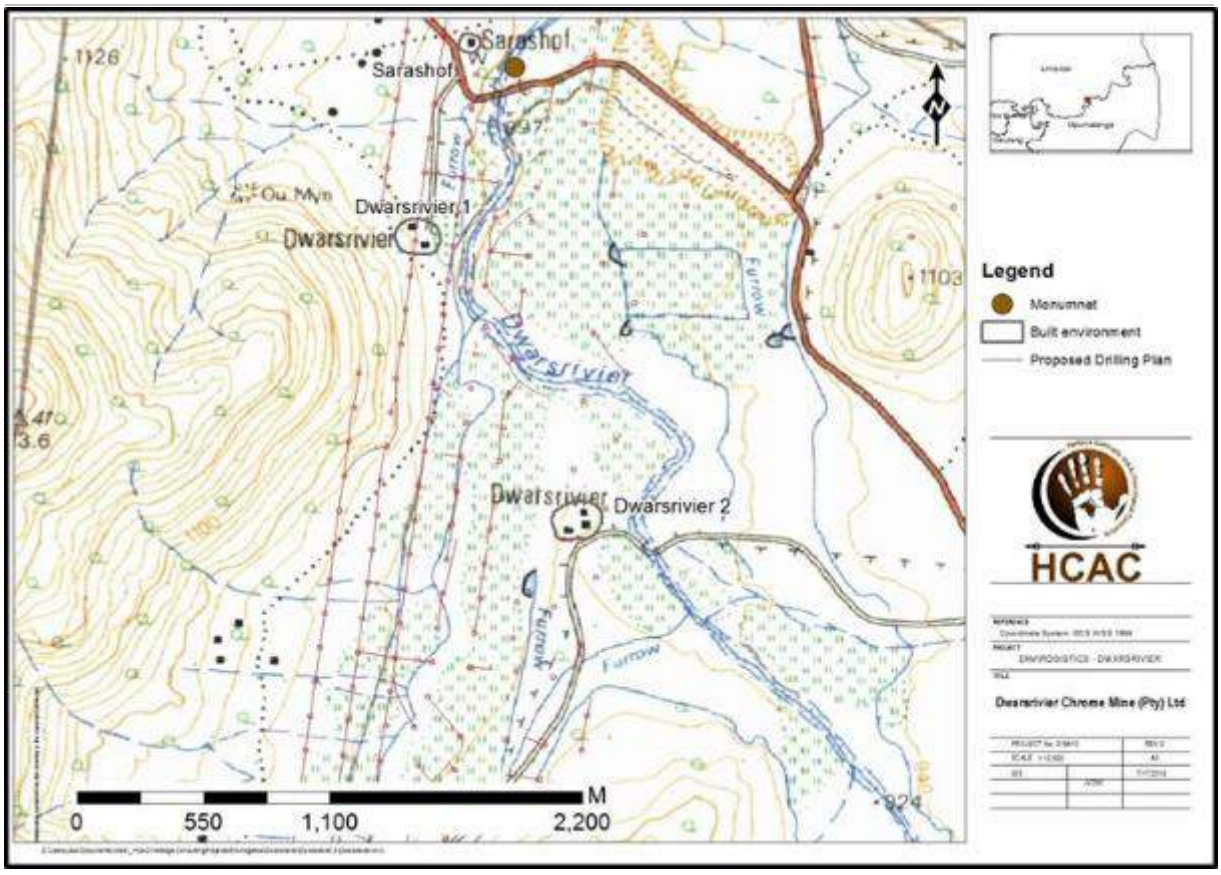


Figure 69. Structures (Sarashof & Dwarsrivier 1) in relation to Project 1.

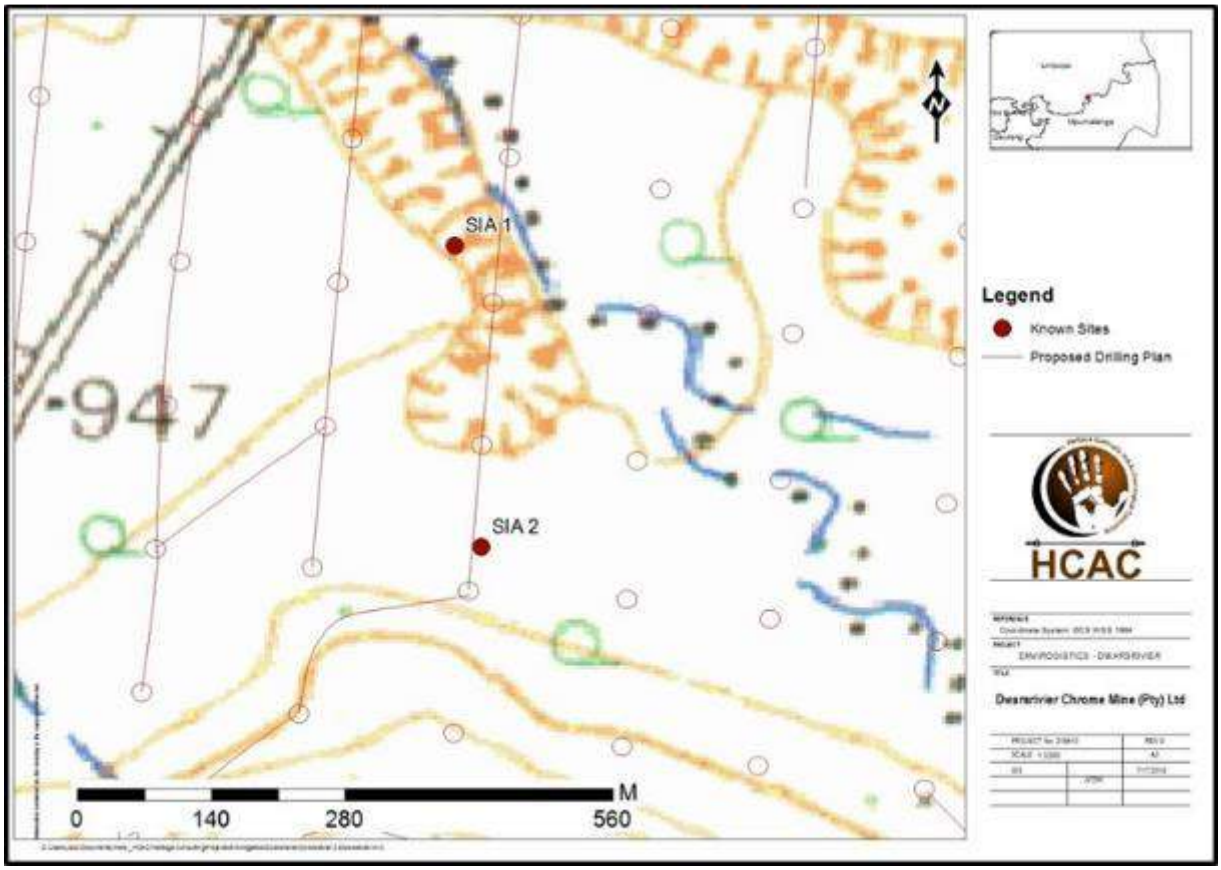


Figure 70. Iron Age sites in relation to Project 1.

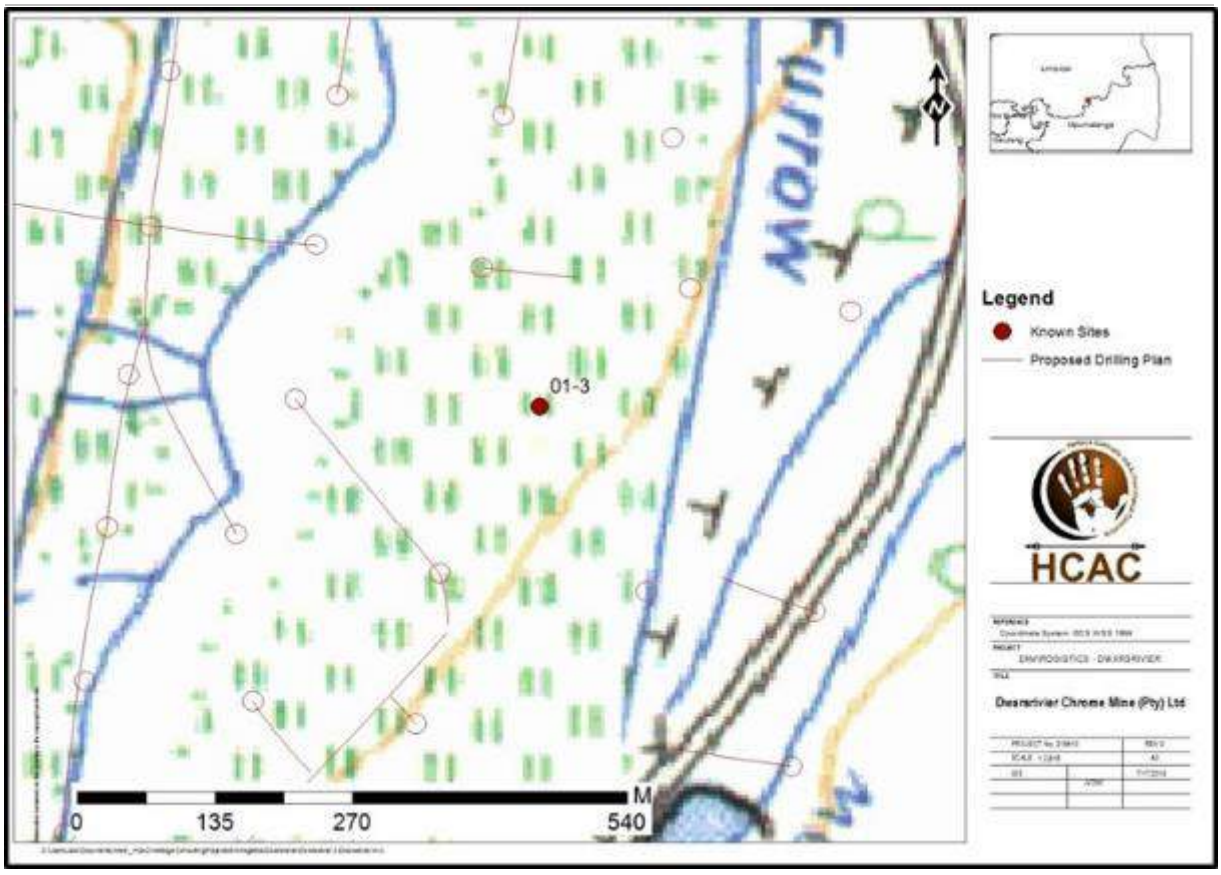


Figure 71. Known graves in relation to Project 1.

In terms of the other projects the proposed developments are located within areas already impacted on by mining activities and no sites of significance were recorded in these areas.

Built Environment

Three structures were identified from 1:50 000 topographic maps in the study area for Project 1 (refer to the table and figure presented above). These structures will not be directly impacted on as per the previous Drilling Plan in terms of the Scoping Report, but if these structures are still standing care should be taken to avoid the structures during exploration. No standing structures older than 60 years occur in the impact area of Project 2, 3 and 4.

The well-known geological monument referred to as the "Dwarsrivier National Monument" is located close to some of the drill pads and marks an area with rare geological phenomena.

Burial Grounds and Graves

In terms of Section 36 of the NHRA graves were recorded in the impact area of Project 1 by Van Vollenhoven and Pelser (2001). The site (01/3) comprises seven (7) graves of which two (2) have headstones and date to 1958 and 1978 based on the inscriptions the other 5 graves are unmarked. The site is located at S24° 56' 58"and E30° 06' 08". Graves are of high social significance.

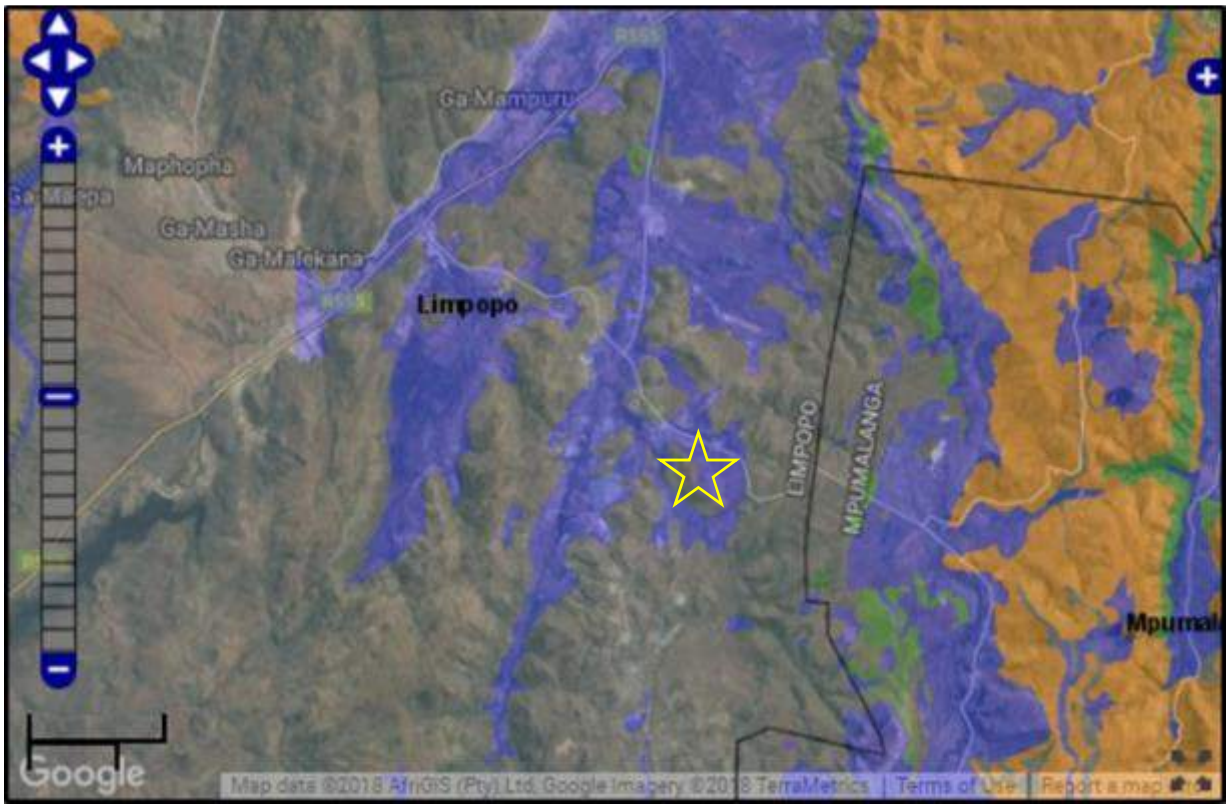
No burial sites were recorded in the impact areas of Project 2, 3 and 4.

1.g.iv.1.l.4 Archaeological and Paleontological Resources

In the impact area of Project 1 two (2) Iron Age sites were recorded by Stegman & Roodt (2012). The sites comprise a possible Eiland facies site (SIA 1) located at S24° 57' 58.3" E30° 05' 52.9" as well as a cattle enclosure (SIA 2) that was recorded near the foothill of the mountain. The enclosure belongs to either the Marateng groups or Masha Tribe (Stegmann & Roodt 2012). The authors could not confirm this as no ceramics could be located due to the dense vegetation. The area was located by distinct changes in type of grass growing in the immediate vicinity of the enclosure. The authors did not allocate a field rating or significance to the site.

No archaeological sites or artefacts of significance was recorded in the impact areas of Project 2, 3 and 4. Widely scattered MSA artefacts are found in the study area but these artefacts are out of context and of no heritage significance apart from noting their presence in this report.

Based on the SAHRA paleontological map the area is of no and low significance and no further studies are required (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 paleontological 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 72. Paleontological Sensitivity of the study area (star) is indicated as insignificant and low.

1.g.iv.1.m Socio-Economic Setting

According to the 2011 Statistics of South Africa (Stats SA) information; the total population of the former Fetakgomo and Greater Tubatse municipalities combined is approximately 429,471 with 106,050 households; this makes the Fetakgomo-Greater Tubatse Local Municipality the municipality with the highest population in the District. It also appears from the current 2016 Community Survey as compared to the 2011 Stats SA results that within the Fetakgomo-Greater Tubatse Local Municipality that there has been a population increase to 490,381 with a household increase of 125,454 . As per the recent 2016 Community Survey, the population of the former Greater Tubatse Local Municipality increased with 0.037% and the former Fetakgomo Local Municipality increased slightly with 0.007. The total percentages of Fetakgomo Greater Tubatse Local Municipality as combined, therefore increased with 0.043%.

The following information has been obtained from the Final 2016 IDP of the municipality.

<u>Households</u>

The total number of Households for Fetakgomo-Greater Tubatse Local Municipality in 2011 as combined was 106.050 and 125.454 in 2016; which makes the municipality the biggest municipality in the District. The municipality has shown a growth of 8% growth in 2016. This might be due to the mining activities taking place in the area.

People and Age

Prior to 2011, the Fetakgomo-Greater Tubatse Local Municipality's population decreased by 16.4% just in four years, between 2007 and 2011 according to the IDP. The municipality's population was presented as 93 814 people, which presented an increase of 16.4% since the previous census (StatsSA census 2011). The decrease during this period is explained largely by migration i.e. there is out-migration of people from rural to the urban areas for various reasons including, but not limited, to better job opportunities, access to social amenities and facilities in urban areas (water, good roads, hospitals, schools, higher educational facilities etc.). Demographic factors such as mortality and fertility factors appear to also play a role.

The 2011 Census demographic research presented that median age for the Fetakgomo-Greater Tubatse Local Municipality's population is around 15-19 years.

Economic Development Sectors

Tourism

Tourism in Fetakgomo-Greater 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 39: 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-Greater 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 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, Dwars-river, 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 Platinum Mine and Phokathaba Mine.
- The following platinum mines are still under prospection or at project stage: Spitzkop Mine, Grooteboom Mine, Nkwe Platinum Mine, Booysendal, Der Brochen 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.g.iv.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 Capital Projects will to a large extent be located in already disturbed areas but the exploration activities will mainly be on natural land. The following will be required:

- Clearing of Vegetation;
- Removal and stockpiling of soils;
- Shaping of the landscape;
- Temporary crossing of non-perennial drainage channels by access roads to the exploration/ drilling pads; 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 vegetation, and potential spread of invasive species and potential disturbance of habitat for faunal species);
- Impact on the freshwater resources;
- Soils (removal of soils for stockpiling);
- Cultural Heritage Sites; and
- Topography (shaping).

1.g.iv.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).

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 PCDs, the Upper RWD and the Lower RWD, situated adjacent to the old TSF. Both dams are lined with high-density polyethylene (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 Storage Facility).

To the west of the project area, Two Rivers Platinum Mine is located. This mine mines platinum via underground mining operations. Various mining infrastructure, a TSF and water management structures are present in this area.

Current land use activities associated with the area and surrounding areas are largely dominated by wildlife and wilderness, including extensive mining operations. Fallow lands/ old agricultural field were also identified on the north central portion of the area and are occasionally used for grazing. No current agricultural activities were observed within the Mining Right Area and the surrounding areas. Please refer to Figure 32, Figure 33 and the following figure.

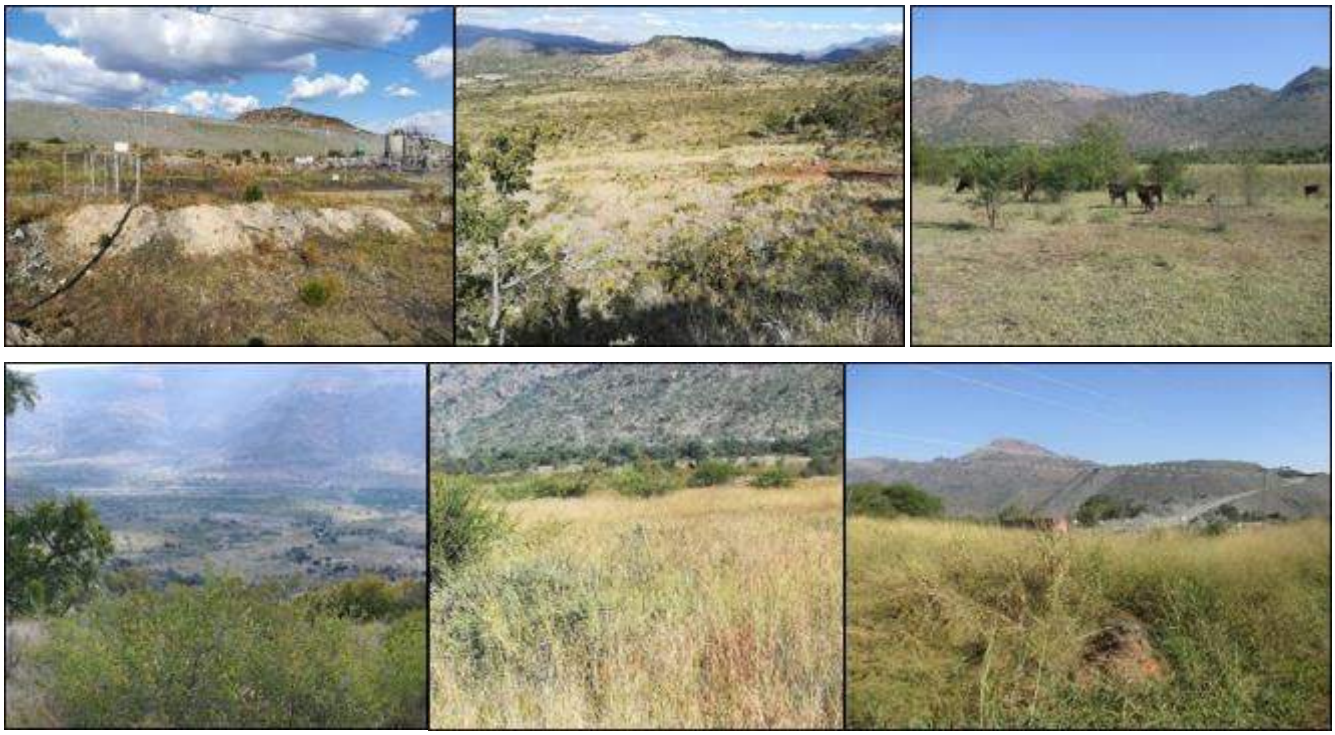


Figure 73: Photographic presentation of the dominant land uses within the area

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.

Historical Potential

The estimated dryland production potential of the area is 4 tons per hectare (t/ha). The grazing capacity is approximately 6 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 Platinum and Glencore Thorncliffe Mines operating in the adjacent farm portions.

1.g.iv.4 Description of Specific Environmental Features and Infrastructure on Site

The following specific environmental features are present on site:

- Three wetland identified through the NFEPA database, which are in fact not wetlands but rather the mines' internal Return Water Dams (refer to Section 1.g.iv.1.i);
- The site is located in CBA 1 and ESA 2 areas (refer to Section 1.g.iv.1.e).
- The Dwarsrivier is considered a Flagship River in terms of the NFEPA database, and therefore all activities will be located outside of the 1:100 year flood line (refer to Section 1.g.iv.1.g.5).

1.g.iv.5 Environmental and Current Land Use Map

Please refer to Figure 74.

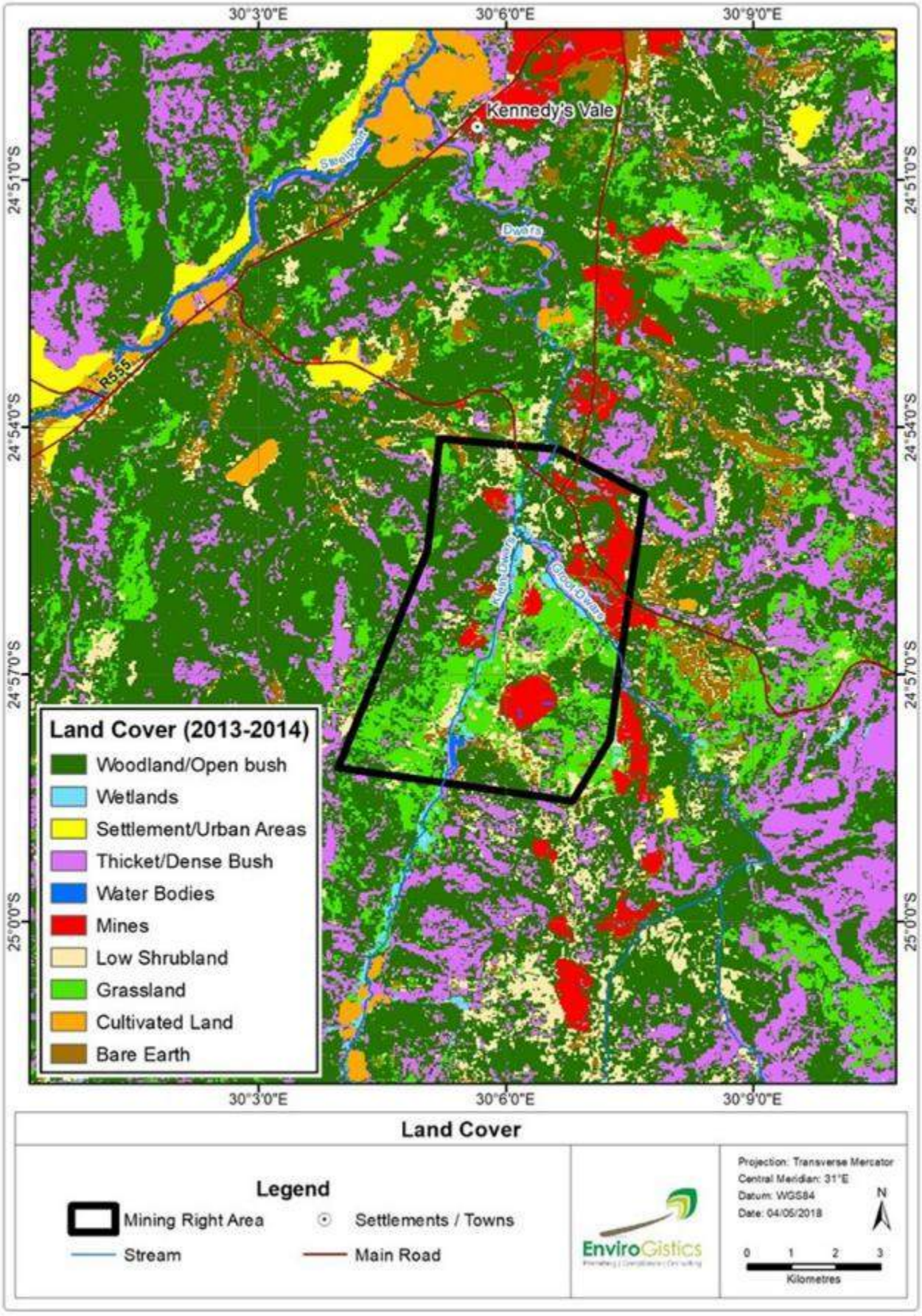


Figure 74: Land use map

1.g.v Impacts and Risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be mitigated

1.g.v.1 Typical Activities to be undertaken

Before the impact assessment can be done, the different activities must be identified, mapped and understood. The activities directly related to this impact assessment are listed in Table 8 discussed in the first section of the report. Each of these activities were assessed in detail as part of the specialist investigations.

Various phases of implementation have been considered in the identification of the activities to be assessed and includes:

- Pre-construction activities which would include fencing of the mining sections (sites), earth clearing activities (clearing of vegetation, soil stripping), the demarcation of the areas in question, the drafting and agreement to land access contracts as well as relocation of infrastructure where required, and the understanding and training of personnel in environmental and safety legalities and requirements.
- During the construction phase, the appointed contractors will be responsible for the main earthworks, establishment of laydown areas, road construction and upgrades, security checkpoints and surface infrastructure. It should be noted that the laydown areas will be established on areas which are demarcated for construction activities. During the construction phase an Environmental Control Officer (ECO) will be appointed to ensure that all activities are undertaken in line with the approved Environmental Authorisations.
- During the operational phase, all activities will be in place and the only ongoing clearance will be that of the ongoing exploration drilling activities. The operational phase will involve the management and coordination of exploration drilling activities, the management and coordination of the truck parking area and associated road usage, the management of hydrocarbons in and around the oil and fuel (diesel) storage and supply areas and general environmental management and controls.
- The decommissioning and closure phase will be undertaken in line with the mine's overall closure commitments and will involve the removal of all infrastructure and the rehabilitation of the land to its end land use commitments.

The mining activities can be summarised as the following.

1. Planning Phase
    a. Legal Requirements (environmental and related permit applications); and
    b. Drafting and agreements to land access contracts, operational contracts and any required protocols and procedures (such has Emergency Preparedness, Health and Safety, Hydrocarbon Management, Incident Reporting, etc.).
2. Construction Phase
    a. Demarcation of areas approved for construction;
    b. Land and footprint clearance (topsoil stripping and stockpiling);
    c. Establishment of surface infrastructure;
    d. Establishment of product stockpile containment; and
    e. Waste management.
3. Operational Phase
    a. Operation of the facilities such as the laydown areas, administrative offices, truck parking areas);
    b. Implementation of the exploration drilling for the next five (5) years;
    c. Transportation (within the site and to and from the truck parking areas);
    d. Operation of diesel storage and supply areas;
    e. Storing of treated water in the reservoir for supply to the mining operations; and
    f. Waste management and handling.
4. Decommissioning/ closure
    a. Removing/ selling of all product stockpiles;
    b. Dismantling and decommissioning of infrastructure and buildings, including product stockpiles bunded areas;
    c. Contaminated land assessment around the diesel storage and supply areas;
    d. Earth moving, shaping and ripping of ground;
    e. Self-succession/revegetation; and
    f. Cessation of Labour Contracts.

Based on the above activities detailed tables are provided with all the identified impacts associated with the environmental authorisation application together with the significance before and after mitigation. Proposed mitigation measures are also provided for each identified impact. Please refer to Table 51 to Table 54 for the detailed table per mining phase of each listed impact.

1.g.v.2 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;
- Successfully analyse all public issues raised to date in order to recommend appropriate mitigation measures for all social and environmental related concerns; and
- 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.g.v.2.a Criteria of assigning significance to potential impacts

The evaluation of impacts is conducted in terms of the criteria detailed in Table 40 to Table 45. 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 is applied to rate each identified impact in terms of its overall magnitude and significance (Table 45).

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.g.v.2.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 40: 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.g.v.2.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 41: 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.g.v.2.d Impact Duration

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

Table 42: 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.g.v.2.e Impact Probability

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

Table 43: Probability of Impact

Rating	Description	Quantitative rating
Improbable	Possibility of the impact materializing is negligible; Chance of occurrence <10%.	1
Probable	Possibility that the impact will materialize 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.g.v.2.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 44: 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.g.v.2.g Impact Significance

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

Table 45: 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 – 17
	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 - 17

1.g.v.3 Impacts and Risks identified

In addition to the specialist studies on the environmental considerations, the project also considered the potential impct discard rock could have, should this be used for road construction or parking areas. Before the impact tables are presented, the outcomes of the waste classification is presented:

1.g.v.3.a Considering the leachability of Waste Rock and Discard Rock

A number of samples were taken from discard, waste rock and tailings material at the mine in order to characterise the quality of leachate that may be associated with mine residue deposits at the operations. These studies were important to understand whether the use of discard rock for road construction could have an impact on the environment.

The samples are described in the table below and sampling locations are indicated on Figure 75.

Table 46: Sample description

Sample number	Description
Discard	Discard material from the South Residue Dump West
Sample 1	Additional discard sample taken from the South Residue Dump East
Sample 2	Additional discard sample taken from the South Residue Dump East
Sample 3	Additional discard sample taken from the South Residue Dump East
Discard S	Discard material from the South Residue Dump East
Old Tailings	Historical tailings material, partially reworked, on the Old TSF
WRD South	Waste rock from the South Residue Dump East
WRD North	Waste rock from the North Residue Dump West
WRD South Reh	Rehabilitated waste rock material from the South Residue Dump South

A detailed description of the outcome of the study is presented in iLEH (2018) (see Annexure 8). The results of the analyses on materialsamples are presented in the following two tables.

Table 47: Results of the Total Concentration Tests on material samples

Units	DISCARD_A		DISCARD S_A		OLD TAILINGS_A		WRD SOUTH_A		TCT0 (mg/kg)	TCT1 (mg/kg)	TCT2 (mg/kg)
	mg/ℓ	mg/kg	mg/ℓ	mg/kg	mg/ℓ	mg/kg	mg/ℓ	mg/kg			
As, Arsenic	0,034	13,6	0,052	20,8	0,111	44,4	<0.010	<4.00	5,8	500	2000
B, Boron	<0.025	<10	<0.025	<10	<0.025	<10	<0.025	<10	150	15000	6000
Ba, Barium	0,079	31,6	0,073	29,2	0,098	39,2	0,111	44,4	62,5	6250	25000
Cd, Cadmium	0,008	3,2	0,006	2,4	0,006	2,4	0,015	6	7,5	260	1040
Co, Cobalt	0,128	51,2	0,107	42,8	0,098	39,2	0,114	45,6	50	5000	20000
CrTotal, Chromium Total	20	8000	20	8000	67	26800	11	4400	46000	800000	N/A
Cu, Copper	<0.010	<4.00	0,014	5,6	0,037	14,8	0,023	9,2	16	19500	78000
Mn, Manganese	2,88	1152	2,73	1092	2,2	880	2,71	1084	1000	25000	100000
Mo, Molybdenum	<0.025	<10	<0.025	<10	<0.025	<10	<0.025	<10	40	1000	4000
Ni, Nickel	1,13	452	1,07	428	1,04	416	0,971	388,4	91	10600	42400
Pb, Lead	0,02	8	0,025	10	0,029	11,6	0,015	6	20	1900	7600
Sb, Antimony	<0.020	<8.00	<0.020	<8.00	<0.020	<8.00	<0.020	<8.00	10	75	300
Se, Selenium	<0.010	<4.00	<0.010	<4.00	0,016	6,4	<0.010	<4.00	10	50	200
V, Vanadium	0,029	11,6	<0.025	<10	0,361	144,4	<0.025	<10	150	2680	10720
Zn, Zinc	0,118	47,2	0,092	36,8	0,196	78,4	0,123	49,2	240	160000	640000
Cr(VI), Chromium (VI) Total [s]	---	<5	---	<5	---	<5	---	<5	6,5	500	2000
Total Fluoride [s] mg/kg	---	101	---	101	---	105	---	101	100	10000	40000

Units	WRD NORTH_A		WRD SOUTH REH_A		Sample 1		Sample 2		Sample 3		TCT0 (mg/kg)	TCT1 (mg/kg)	TCT2 (mg/kg)
	mg/ℓ	mg/kg	mg/ℓ	mg/kg	mg/ℓ	mg/kg	mg/ℓ	mg/kg	mg/ℓ	mg/kg			
As, Arsenic	0,075	30	0,075	30	0,034	14	<0,010	<4,00	0,070	28	5,8	500	2000
B, Boron	<0.025	<10	<0.025	<10	<0,025	<10	<0,025	<10	<0,025	<10	150	15000	6000
Ba, Barium	0,12	48	0,184	73,6	0,163	65	0,134	54	0,131	52	62,5	6250	25000
Cd, Cadmium	0,006	2,4	0,009	3,6	0,019	7,60	0,015	6,00	0,015	6,00	7,5	260	1040
Co, Cobalt	0,099	39,6	0,123	49,2	0,135	54	0,112	45	0,129	52	50	5000	20000
CrTotal, Chromium Total	11	4400	17	6800	17	6800	13	5200	42	16800	46000	800000	N/A
Cu, Copper	<0.010	<4.00	<0.010	<4.00	0,012	4,80	0,016	6,40	<0,010	<4,00	16	19500	78000
Mn, Manganese	2,11	844	2,81	1124	3,36	1344	3,17	1268	2,79	1116	1000	25000	100000
Mo, Molybdenum	<0.025	<10	<0.025	<10	<0,025	<10	<0,025	<10	<0,025	<10	40	1000	4000
Ni, Nickel	0,845	338	0,97	388	1,14	456	1,06	424	1,02	408	91	10600	42400
Pb, Lead	0,031	12,4	0,032	12,8	<0,010	<4,00	<0,010	<4,00	<0,010	<4,00	20	1900	7600
Sb, Antimony	<0.020	<8.00	<0.020	<8.00	<0,020	<8,00	<0,020	<8,00	<0,020	<8,00	10	75	300
Se, Selenium	<0.010	<4.00	<0.010	<4.00	<0,010	<4,00	<0,010	<4,00	<0,010	<4,00	10	50	200
V, Vanadium	<0.025	<10	0,072	28,8	0,115	46	<0,025	<10	0,253	101	150	2680	10720
Zn, Zinc	0,116	46,4	0,14	56	0,148	59	0,124	50	0,194	78	240	160000	640000
Cr(VI), Chromium (VI) Total [s]	---	<5	---	<5	---	<5	---	<5	---	<5	6,5	500	2000
Total Fluoride [s] mg/kg	---	109	---	109	---	99,3	---	84,7	---	91,7	100	10000	40000

Table 48: Results of the Leachable Concentration Test

Elements	DISCARD_A	DISCARDS_A	OLD TAILINGS_A	WRD SOUTH_A	WRD NORTH_A	WRD SOUTH REH_A	Sample 1	Sample 2	Sample 2	LCT0 (mg/l)	LCT1 (mg/l)	LCT2 (mg/)l	LCT3 (mg/l)
As, Arsenic	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,01	0,5	1	4
B, Boron	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,5	25	50	200
Ba, Barium	<0.025	<0.025	0,04	<0.025	<0.025	<0.025	0,062	0,081	0,057	0,7	35	70	280
Cd, Cadmium	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0,003	<0,003	<0,003	0,003	0,15	0,3	1,2
Co, Cobalt	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,5	25	50	200
Cr (Total)l, Chromium Total	0,028	0,066	0,39	0,082	0,032	0,025	<0,025	0,041	<0,025	0,1	5	10	40
Cr(VI), Chromium (VI)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,05	2,5	5	20
Cu, Copper	<0.010	<0.010	0,047	<0.010	<0.010	<0.010	<0,025	<0,025	<0,025	2	100	200	800
Hg, Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-				
Mn, Manganese	<0.025	<0.025	0,235	0,053	0,063	0,055	0,925	1,07	0,868	0,5	25	50	200
Mo, Molybdenum	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	0,07	3,5	7	28
Ni, Nickel	<0.025	<0.025	0,114	<0.025	<0.025	<0.025	0,071	0,035	0,026	0,07	3,5	7	28
Pb, Lead	<0.010	<0.010	0,012	<0.010	<0.010	<0.010	0,021	<0,010	0,020	0,01	0,5	1	4
Sb, Antimony	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0,020	0,023	0,034	0,02	1	2	8
Se, Selenium	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0,010	<0,010	<0,010	0,01	0,5	1	4
V, Vanadium	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	0,047	<0,025	0,2	10	20	80
Zn, Zinc	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0,025	<0,025	<0,025	5	250	500	2000
Total Dissolved Solids	30	40	130	56	50	58	280	270	232	1000	12500	25000	100000
Chloride as Cl	<2	<2	4	2	<2	<2	<2	<2	<2	300	15000	30000	120000
Sulphate as SO_4	<2	<2	6	<2	2	<2	2	<2	<2	250	12500	25000	100000
Nitrate as N	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0,1	<0,1	<0,1	11	550	1100	4400
Fluoride as F	<0.2	<0.2	0,3	0,2	0,2	<0.2	<0,2	<0,2	<0,2	1,5	75	150	600
pH	7	7	7,3	7	6,6	7,1	4,8	4,8	4,8				

A summary of the main is provided below for ease of reference. The results of the Total Concentration (TC) test show:

- The main elements present in the rock and tailings material analysed is total chromium, manganese and nickel.
- The TC values from the tests are all below the TCT1 threshold values for all elements analysed.
- TC values that exceed the TCT0 threshold values in material are listed below.
  - Arsenic (As) total concentrations exceed the TCT0 threshold value for the samples taken, except the WRD South sample. The highest concentration was recorded for the Old TSF.
  - The Barium (Ba) total concentration exceeds the TCT0 threshold value for the WRD South Reh sample (rehabilitated WRD).
  - Manganese (Mn) total concentrations exceed the TCT0 threshold value for all samples except the WRD North.
  - Nickel (Ni) concentrations exceed the TCT0 threshold value for all samples taken.
  - Fluoride (F) total concentrations exceed the TCT0 threshold value slightly for all samples analysed.

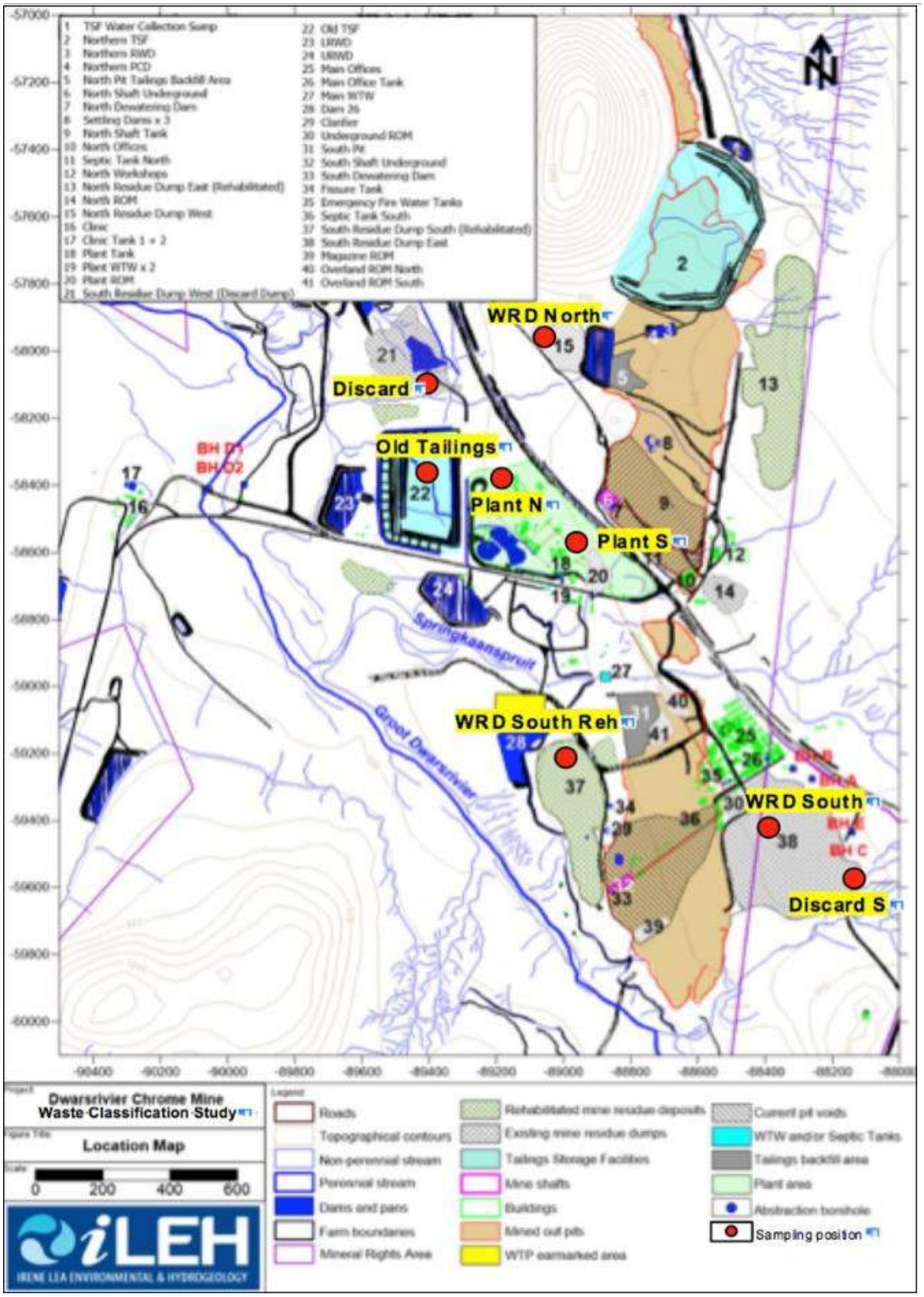


Figure 75: Leach test sampling positions

The results of the Leachable Concentration (LC) tests show:

- The majority of the elements analysed for were below the laboratory detection limit and below the LCT0 threshold value.
- The LC concentrations are below the LCT0 threshold values for all elements analysed.

- The outcome of the both the Total Concentration and Leachable Concentration Tests, indicate that all of the samples taken have Total Concentration (TC) values below the Total Concentration Threshold (TCT) 1 level.
- The results further indicate that the LCs for all the samples are below the lowest Leachable Concentration Threshold (LCT0) value.

For the purpose of this project, it is proposed to utilise the discard rock from the current Discard Storage Facility, located north of the Old TSF. The discard rock on this facility (which is the only active discard facility) results in the following:

The results of the Total Concentration (TC) test show:

- The TC values from the tests are all below the TCT1 threshold values for all elements analysed.
- TC values that exceed the TCT0 threshold values in waste rock material are listed below.
    - Arsenic (As);
    - Cobalt (Co);
    - Manganese (Mn);
    - Nickel (Ni); and
    - Fluoride (F).

Leach tests have an important role in providing information to support the assessment of the environmental risks associated with the material sampled as it determines the concentrations of chemical constituents in soil pore water that may come in contact with surface water bodies, groundwater, fauna and flora. In order to understand the risk of mine residue deposition at the mine, it is important to understand whether or not the leachable chemical constituents are below the threshold values set in the Norms and Standards for Waste Classification.

The results of the Leachable Concentration tests show:

- The majority of the elements analysed for were below the laboratory detection limit and all elements were below the LCT0 threshold value.

The definition of the waste rock, discard and tailings material sampled, based on the outcome of the both the Total Concentration and Leachable Concentration tests, is presented in the following table.

Table 49: Dwarsrivier Mine waste type definition

Sample ID	TCT classification	LCT classification	Waste definition
Discard	TC < TCT1	LC ≤ LCT0	Type 3*
Sample 1	TC < TCT1	LC ≤ LCT1	Type 3
Sample 2	TC < TCT1	LC ≤ LCT1	Type 3
Sample 3	TC < TCT1	LC ≤ LCT1	Type 3
Discard S	TC < TCT1	LC ≤ LCT0	Type 3*
Old Tailings	TC < TCT1	LC ≤ LCT1	Type 3
WRD South	TC < TCT1	LC ≤ LCT0	Type 3*
WRD North	TC < TCT1	LC ≤ LCT0	Type 3*
WRD South Reh	TC < TCT1	LC ≤ LCT0	Type 3*

* Even though the LC ≤ LCT0 for these samples, the TC > TCT0, which discounts the classification of the waste as Type 4.

As indicated below the table, only the Old TSF and additional discard material sample meet the criteria to be classified as a Type 3 waste. The other five samples have LC values below the LCT0 threshold value. However, due to the fact that the TC values for all samples exceed the TCT0 values for the elements listed above, the waste cannot be classified as Type 4 in terms of the Waste Regulations.

Based on the outcomes of the study it is recommended that the Discard Storage Facility be considered for the use in road construction, etc. and there is no LC limits triggered.

1.g.v.3.b Impact Assessment

Please refer to Table 51 to Table 54 which presents the impacts assessed based on the Sections hereafter. The impacts makes provision for the significance identified before and after mitigation. The tables further indicate in the view of the EAP, whether these impacts can be reversed, avoided and or whether it is irreplaceable. For future clarity, please als refer to the following sections: Sections 1.g.v.3.a; 1.g.v.3.b; 1.g.v.4; 1.g.v.51.j, as well as Annexure 6.

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1.g.v.4 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

As mentioned before (Section 1.f.i) the demand for chrome has increased globally due to the increase in China Markets. Not allowing the exploration activities will result in a lost opportunity to understand the optimal mining potential within the area, not only based on economic considerations, but also in terms of safe mining considerations.

Not allowing activities such as the Truck Parking Area and the Low-Grade Product Stockpile area, will further lead to a restriction on the volume of this material to be produced and dispatched to the required markets. This will result in restricting the mine to market supply available reserves, and could impact on the economics of scale of the mining operation.

The Capital Projects and Fuel and Oil Storage Project are important to the mine to optimise operational logistics within the Mining Right Area, and by not allowing the formalisation and improvement of activities such as proposed at the Security Access area, North Mine Infrastructure and South Mine Laydown area, would result in a lost opportunity for the mine in terms of continuous improvement.

Planning Phase

During the Planning phase, no specific impacts will take place directly, however, poor planning during this phase, could result in significant project delays. This will be due to environmental authorisations and other permits not being in place and/or agreements being not in place between all surface landowners where applicable to enable access.

Construction Phase

Logistical Impacts

During the construction phases of the activities, there is the possibility of impacting on the logistical arrangements of adjacent mines, such as Two Rivers Platinum Mine. This is due to the upgrades which will be required on the regional access road, which is also utilised by Two Rivers Platinum for personal transportation and product transportation. The establishment of infrastructure for the exploration activities may also impact on Two Rivers Platinum, as certain proposed drilling sites and exploration activities are located in the vicinity of areas where operational activities of the said mine is being undertaken.

Topography and Soils

The construction of infrastructure and stockpiles will alter the topography by adding features to the landscape which may have a negative impact if not suitably planned to blend into the environment where possible (specifically considering access roads to the exploration drilling sites). Topsoil removal and excavations will alter the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and excavations, and therefore the areas will be bare and susceptible to erosion.

The area is characterised by steep and gradual slopes, consisting of shallow and moderately deep soils respectively. The areas where the infrastructure is proposed are mostly gradual, however some of the exploration activities will be located among the mountainous setting within areas where erosion is considered moderately high. The natural and undisturbed soils will become more vulnerable to erosion once the vegetation is cleared for construction activities, and the soils will inevitably be exposed to wind and some surface runoff during intensive rainfall events.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil may be carried away during runoff if not protected. The cleared areas will be rehabilitated as part of ongoing rehabilitation, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless it is remediated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. There is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil may be stockpiled for rehabilitation without the necessary storm water management systems in place. Soil pollution is therefore possible, but through mitigation it can be minimised or avoided.

The proposed mining and related infrastructure are not anticipated to result in a significant loss of agricultural land capability since the majority of the soils where mining-associated infrastructure is to occur are significantly disturbed and shallow and not suitable for agricultural production. These soils are therefore not considered to contribute to the provincial and national agricultural production grid. It must be noted however that exploration activities will intercept fallow lands which have been previously cultivated. Although some of these areas are comprised of low agricultural potential soils (i.e. Acardia, commonly known as black turf), these soils can still be utilised for Lucerne grass cultivation under extensive management practices. Thus, concurrent rehabilitation within these areas is deemed necessary. The land capability loss is anticipated to range between medium low for Hutton and Bonheim due to the limited extent of these soils, and low for Mispah and Glenrosa as these soils are not considered ideal for cultivation due to their shallow nature and high erosion hazard. It is imperative that the Hutton and Bonheim soils be avoided, if feasible, since these soils arable and present an opportunity for cultivated agricultural production. From a land capability perspective, Witbank (anthrosols) soils have no bearing on agricultural production, and as such the impacts on these soils is anticipated to be low. It is important to note that based on the specialist studies, the Hutton soils will not be disturbed and only 4 drill pads are planned in the Bonheim Soils. It is important that the project team ensure that these soils are also avoided as far as practically possible with the construction of the temporary access roads.

Heavy equipment traffic during construction and exploration activities is anticipated to cause soil compaction. The severity of this impact is anticipated to be medium-high for Rensburg and Acardia soils associated with the Klein Dwarsrivier system due to clayey texture. Whereas soils with a relatively shallow bedrock and lithocutanic character (partly weathered rock material) such as the Glenrosa/Mispah soil forms are anticipated to be less impaired due to the resistance offered by the underlying bedrock.

In general the area is predominantly used for mining and wildlife/wilderness with no active crop cultivation due to soil constraints, attributable to the shallow nature and high clay content of the dominant surrounding soils. As the Mining Right Area is predominantly comprised of low potential agricultural soils, a low impact is foreseen on these soils from a land capability point of view after implantation of mitigation measures during all phases of development. The dominant soils have little bearing on agricultural productivity, with limited contribution to the local, regional, provincial as well as national food production. However, their protection, where feasible is deemed imperative to ensure that the area remains functional post-closure. The impact is anticipated to be very low in areas where soils have been anthropogenically transformed since these soils are not regarded as important for cultivated agricultural production as their structure has been largely destroyed. Thus, these soils could not be assigned to neither arable nor grazing land capability classes.

The surrounding areas within which the proposed mining and related infrastructure is to occur are Witbank soils (anthrosols) dominated by wildlife and wilderness land uses, and no significant cultivated agricultural activities were observed in the vicinity. This is largely attributable to the shallow nature of the surrounding soils. Therefore, the proposed Capital Projects are not anticipated to significantly contribute to the cumulative loss of arable land and herbaceous material for grazing after mitigation measures have been put in place. In addition, since the majority of these proposed activities are to occur on disturbed soils, both physical and chemical latent impacts are anticipated to be relatively low after mitigation measures have been implemented during all phases of development as outlined in this document. It should be noted however that cumulative loss of wilderness soils is likely to occur particularly on sloping areas during drilling and exploration activities, some of which will be unavoidable even when mitigation measures have been implemented. However, the project is not seen as a fatal flaw. Thus, from a soil and land capability point of view, the addition to the cumulative impact footprint of the region is considered relatively minor

Ecology (Flora)

The majority of the project area falls within a CBA 1. These are Irreplaceable areas, which are required to meet biodiversity pattern and/or ecological processes targets; and with no alternative sites available to meet targets and as such any further loss of habitat are likely to compromise the targets of the CBA 1.

Sekhukhune Mountain Bushveld

The Sekhukhune Mountain Bushveld habitat sensitivity is considered high. The clearing of vegetation as part of the drill pads and the access roads will lead to the direct loss of floral species and preferred habitat of floral SCC within these areas. The floral habitat in the Sekhukhune Mountain habitat unit is considered to largely intact, with the majority still in pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

The proposed Capital Project layout areas are unlikely to have a significant impact on floral species in the region as no Sekhukhune Mountain Bushveld habitat unit is present within these proposed areas.

Due to the large extent and the locations of the proposed drill pads and associated roads, habitat for floral SCC will be permanently altered, with special mention of the location of proposed drill pads in the southern and south-eastern sections of the Mining Right Area. Although the footprint areas of the drill pads are small, it will still result in a considerable amount of vegetation being cleared, especially with the construction of roads to gain access to these areas.

Sekhukhune Bushveld

The Sekhukhune Bushveld habitat sensitivity is considered moderately high. The clearing of vegetation as part of the drill pads and access roads will lead to the loss of floral species and preferred habitat of floral SCC within these focus area. Sekhukhune Mountain Bushveld habitat located within the proposed Capital Project expansion areas have already been affected by edge effects of current mining activities and is thus not in pristine condition. The floral habitat in the remainder of Sekhukhune Bushveld habitat unit is considered to be largely intact, with the majority of the area still in a pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

Only Option 3 of the truck parking is considered to be an increased risk to floral SCC. The location of Option 3 will result in the loss of preferred habitat for such species alongside the Groot Dwarsrivier. In this regard, Option 1 is considered preferential, as no habitat connectivity will be lost and will have a lower impact on floral SCC.

Due to the large overall extent and the locations of the proposed drill pads and associated roads, large areas of habitat for floral SCC within these areas will be permanently altered, with special mention of the location of proposed drill pads in the northern, southern and south-eastern sections of the Mining Right Area. Although the footprint areas of the drill pads are small, it will still result in a considerable amount of vegetation being cleared, especially with the additional development of access roads.

Freshwater habitat

The Freshwater habitat sensitivity is considered high. The clearing of vegetation as part of the drill pads and the access roads will lead to the direct loss of floral species and preferred habitat of floral SCC within the focus area with special mention of the drill pads. The floral habitat in the Freshwater habitat unit is considered to largely intact, with the majority area still in pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

The Capital Projects, provided they remain outside of any riparian areas and associated buffers, are unlikely to pose a significant threat to freshwater habitat and floral SCC within this habitat.

Old Agricultural Lands

The Old Agricultural Lands habitat sensitivity is considered moderately low. The floral habitat within Old Agricultural Lands habitat unit is considered to be largely disturbed as the area was historically impacted upon by agricultural activities. Vegetation clearing within this habitat unit will lead to further proliferation of alien and invasive plant species.

The Old Agricultural Lands habitat is no longer representative of the CBA 1, but due to natural succession taking floral SCC e.g. *Sclerocarya birrea* subsp. *caffra* have started to re-establish within this habitat unit, and development of drill pads and associated access road in these areas may lead to a loss of protected tree species in these areas.

Transformed habitat

The Transformed Habitat Unit habitat sensitivity is considered low. The floral habitat in the Transformed Habitat Unit habitat unit is considered to be largely disturbed as the area is affected by historic and current mining activities and this habitat is no longer representative of the CBA 1 as a result of historic and current mining activities. Vegetation clearing within this habitat unit may further increase the proliferation of alien and invasive plant species, but the proposed Capital Projects, with the exception of the Truck Parking, located in this area are unlikely to impact on floral diversity, habitat or floral SCC.

Ecology (Fauna)

The proposed Capital Projects are all located within the existing active mining area, and as such, the impacts associated with the various Capital Projects on faunal life are expected to be of low to medium low significance prior to the implementation of mitigation measures. With the cognisant implementation of mitigation measures, these impacts can be minimised to low and very low significance.

The impact significance associated with the drill pads and access roads is notably higher than that of the Capital Projects, as the associated footprints are predominantly located in areas of increased sensitivity and are likely

to impact upon several faunal SCC and niche habitats. Prior to the implementation of mitigation measures, the perceived impacts are of medium low to medium high significance for the areas of increased sensitivity, and low to very low in the less sensitive and disturbed habitats, such as the Old Agricultural Lands. With the implementation of mitigation measures as stipulated in this report, the impact significance associated with the sensitive habitats can be decreased to low and medium low significance, whilst the impact significance associated with the less sensitive habitats can be decreased to low and very low significance.

Freshwater and Aquatic Environment

At the time that the impact assessment was undertaken, the layout as provided by the proponent for Project 1, i.e. resource and reserve mapping, which includes the construction of roads, 'drilling pads' and the clearance of vegetation, indicated that several drilling pads would be located within the active channels, delineated floodplains or riparian zones associated with the freshwater resources, as well as within the flood lines applicable to the freshwater resources. Drilling activity within the active channels, delineated floodplains and delineated riparian zones (especially those with steep banks) is likely to have an unacceptably high cumulative impact on the respective systems (and is thus not supported by the specialist).

The previous positioning of some drill pads within the delineated active channels, floodplains and riparian zones associated with the various freshwater resources would have resulted in significant cumulative impacts to soils, vegetation, flow connectivity and overall condition of habitat. For this reason the 1:100 year floodline was included as a no-go zone for the establishment of the drill pads.

Similarly, mitigating impacts of exploratory drilling within the active channel on the instream ecology of these freshwater systems, is not considered to be practical and is unlikely to be financially viable.

At the time of the assessment, the freshwater resources within the Mining Right Area were all considered to be in a largely natural to largely modified ecological state, depending on indices applied and sites assessed, and of high ecological importance and sensitivity.

Due to the topography of the area, it is possible that the some of the Capital Project development expansion activities in the east, with specific mention of the proposed truck parking area and the treated water reservoir, may impact indirectly on the Groot Dwarsrivier and Springkaanspruit respectively, as they are located downgradient of the proposed activities. However, the distance of the activities from these watercourses will have an influence on the severity of perceived impacts and it is considered unlikely that these activities will have any significant impact.

Rehabilitation opportunities of drainage systems within the Mining Right Area are considered limited, taking into account the severity of the impact in some areas (e.g. instream impacts associated with drilling within the active channels of rivers) and the cumulative impact of previously authorised and planned future mining activities within the catchment. The efficiency with which rehabilitation can be implemented on such a large scale is debatable, and due to the complexity of the freshwater resource rehabilitation process and reinstating hydrological functioning in an area, as well as the risk of contamination of water within the hydrological system that has been reinstated, rehabilitation is not deemed an appropriate mitigation strategy for most of the freshwater resources within the Mining Right Area.

The various drainage systems within the Mining Right Area, are deemed to be in largely natural to moderately modified ecological condition and are considered of very high to moderate Ecological Importance and Sensitivity (EIS). These drainage systems are considered important for biodiversity maintenance as well as contributing to the ecological functioning of downstream systems such as the Dwars River and the Steelpoort River. Whilst the perceived impact significance of some of the proposed expansion activities which this study focuses on (such as the development of additional surface infrastructure) may not necessarily have unacceptably high impacts on the freshwater ecology of the Dwarsrivier Mine, it is important to note that cumulative impacts associated with previously authorised activities (and potential future activities), both within the Dwarsrivier Mine project areas and within the greater catchment of the primary drainage systems (i.e. the Groot Dwars, Klein Dwars and Dwars Rivers) may lead to very high impacts on the freshwater ecology of the region. Therefore, as much as feasible (whilst allowing for the optimal extraction of valuable ore), impacts on and deterioration of the ecological integrity the freshwater resources associated with the Dwarsrivier Mine project area must be minimised as much as practicably possible. Central to this is ensuring that very careful planning of infrastructure layouts and positioning takes place, so as to prevent (ideally) or minimise direct encroachment on freshwater resources. This is particularly pertinent to the planned exploration (drilling) activities. The location of the various freshwater resources within the project area (and 500m thereof) are provided in Section 1.k.ii.1.a.2, along with maps indicating the applicable zones of regulation around these resources in terms of NEMA, GN704 and GN509 of the NWA, and these should be taken into account during the planning and subsequent phases of the mine.

Nevertheless, should the proposed project be approved, very strict adherence to cogent, well-developed mitigation measures must take place in order to minimise and prevent potential impacts on the freshwater resources arising from the proposed activities (particularly the drilling and exploration activities), as well as to minimise the impact significance of cumulative impacts in future.

In addition to the above, although it does not form part of the Scope of Work for this study, it was noted by the specialist that the proponent intends to under-mine the Groot Dwarsrivier in future, although details pertaining to the exact location and intended methods were not available at the time of this assessment. However, according to the EAP (Pers. Comm. T. Bekker, 2018), the depth of mining will be greater than 300m. Thus, the risk of dewatering of the Groot Dwarsrivier is negligible and was therefore not assessed (please refer to the impacts considered by the Hydrogeological Study presented in Section 1.j.

Water

Any excavations and activities within a drainage lines/watercourse may impact on the surface water environment by altering the physical characteristics of such features, this also refers to exploration activities proposed in the flood lines of non-perennial drainage lines. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation. Temporary water crossing may be required for the exploration activities access roads, if this is not properly manged it could have an impact on the watercourses and draining lines. Due to the sensitivity of the environment in the region (CBAs), a high level of mitigation, comprising of avoidance, minimisation and rehabilitation will be required during all phases of the proposed project to ensure that the ecological integrity of the freshwater resources and ecological characteristics in the vicinity of mining activities are not compromised.

Groundwater

- Intersection of groundwater during exploration drilling

The groundwater table will be intersected during exploration drilling. The existing dataset confirms that the average depth to groundwater is 7,5m. Due to the fact that biodegradable drilling fluids will be used, groundwater contamination associated with exploration drilling is not expected to be significant.

Exploration drilling must not take place on the alluvial aquifer. This aquifer is vulnerable to surface sources of contamination, like oil and diesel spills due to its shallow depth and high permeabilities. Contamination of this aquifer will result in adverse and most probably irreversible impacts on groundwater as well as the Dwarsrivier and Groot Dwarsrivier.

No groundwater will be abstracted during the drilling programme. Water required will be trucked in. For this reason, exploration drilling will not cause a lowering in groundwater levels nor compete with existing groundwater abstraction.

Road construction is not expected to significantly impact on groundwater availability or quality, provided that oil and diesel spills do not occur.

The impact of exploration drilling on groundwater quality and availability is not considered significant due to the limited extent and short duration of activities at each drill pad.

In terms of the discard rock usage in road construction, etc. only the Old TSF and additional discard material sample meet the criteria to be classified as a Type 3 waste. The other five samples have LC values below the LCT0 threshold value. However, due to the fact that the TC values for all samples exceed the TCT0 values for the elements listed above, the waste cannot be classified as Type 4 in terms of the Waste Regulations.

Based on the outcomes of the study it is recommended that the Discard Storage Facility be considered for the use in road construction, etc. and there is no LC limits triggered.

- Oil and diesel spills

Uncontained and unmanaged oil and diesel spills associated with infrastructure development will result in contamination of the underlying aquifers. The shallow weathered and alluvial aquifers are especially vulnerable to groundwater contamination.

- Use of discard rock for the construction of roads and the truck stop

The mine proposes to use discard rock for road and truck parking construction. Recent leach tests on the discard rock material indicate that the majority of leachable elements were below the laboratory detection limits. As such, the use of the rock as fill material is not expected to impact significantly on groundwater quality. This

preliminary impact assessment *will be confirmed during the more detailed groundwater study that is currently underway*.

A preliminary assessment is therefore that the use of discard rock for fill during road and truck parking construction will most probably result in an insignificant impact on groundwater water quality during the operational phase of mining and post-closure.

- Under-mining of rivers and streams

Available information suggests that rivers and streams will be under-mined, if the outcome of the proposed exploration programme is positive and underground mining is expanded. A mine plan is not available at present as this will be dependent on the exploration programme outcomes, but is estimated that the depth of mining would be around 300m below surface.

The results of impact assessments undertaken for the existing underground mining activities (iLEH, 2015) suggests that the most significant impact on the upper weathered and alluvial aquifers is a result of groundwater abstraction for water supply to the mine and not from underground dewatering. The mine is in the process of reducing its dependence on groundwater abstraction from the alluvial aquifer. This water will be partially replaced by water from the Water Treatment Plant. Simulations undertaken as part of the 2015 indicate that the impact of underground dewatering is not uniform across the mining area. In areas of shallower under-mining, groundwater levels in the upper weathered and alluvial aquifers may be lowered by 3 – 4m as a result of underground mine dewatering. In these areas, a reduction in the groundwater component to stream base flow was estimated to be between 18 and 98m^3/d, depending on the depth and extent of mining.

Based on the current understanding of the interaction between the shallow weathered and alluvial aquifers and the underground workings, it is unlikely that mining at depths of 300m and deeper would significantly impact on the overlying rivers and streams. If the groundwater component to stream base flow is to be reduced as a result of mining at these mining depths, the reduction will probably be closer to the lower range reported above, around 20m^3/d. *This assessment will be confirmed upon completion of the detailed groundwater study that is currently underway.*

A preliminary assessment is therefore presented that the undermining of rivers and streams will most probably not result in a significant impact over the life of the operations. Post-closure, groundwater levels will recover and residual impacts will reduce with time, most probably within 30 – 80 years of the completion of mining.

Heritage

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Large portions of the project area are characterised by existing mining operations that would have impacted on surface indicators of heritage sites and apart from isolated widely scattered MSA artefacts (of low significance), no archaeological sites of significance were recorded during the survey for the Capital Projects and Diesel Storage. In terms of the exploration programme, two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50-meter buffer zone around the sites.

In terms of the built environment of the area (Section 34 of the NRHA), no standing structures older than 60 years occur within the impact areas for the Capital Projects and Diesel Storage (including decommissioning of existing facilities). Several buildings were however identified from the desktop study close to drill pads and should be avoided with a 30-meter buffer zone. In terms of Section 36 of the NHRA, several burial sites are known to exist in the larger project area. However no burial sites are on record for the areas of impact. If any graves are located in future they should ideally be preserved *in situ* or alternatively relocated according to existing legislation. The area is extensively mined and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns were raised.

The project area is indicated as being of low to insignificant palaeontological sensitivity on the SAHRA palaeontological map. This is corroborated by a paleontological study (Rossouw 2017) that found that the Dwarsrivier Mine area is underlain by paleontologically insignificant intrusive igneous rocks and there is little chance of finding fossil material. The well-known geological monument referred to as the “Dwarsrivier National Monument” is located close to some of the drill pads and will have to be preserved with a buffer zone of 100 meters. No further mitigation prior to construction is recommended in terms of the archaeological and paleontological components of Section 35 for the proposed development to proceed.

Operational Phase

During the operational stages of the mining operation, groundwater may be directly affected if any oil and fuel spillages occur during these scenarios and activities. Similarly, hazardous surface spillages may seep into the underlying aquifers and contaminate ground water if not properly controlled and managed. Improper handling of hazardous material may cause contamination of nearby surface water resources (watercourses) during runoff episodes, if storm water management measures are not implemented. Lack of storm control structures could lead to erosion of topsoil stockpiles during heavy rains and runoff could carry suspended solids into the downstream environment.

During the operation, the abovementioned activities (stockpiling of product and presence of drilling rigs in the area) have the potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations, but is not considered significant due to the type of activities planned. The operation will typically contribute low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary roads and existing mining activities. The proposed operation will add a certain amount of noise to the existing noise in the area, but on a limited scale.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be low with the implementation of the management measures. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users. However, the addition of the truck parking area will have an overall positive impact on the road network, by avoiding the parking of the trucks on the main Sekhukhune Road.

The operation will not create new employment opportunities as the activities planned mainly involve the upgrade of existing activities, and the improvement of logistics in and around the mine. The exploration activities are undertaken to ensure a long term mining plan, which will rather result in long term employment of current staff that necessarily creating new employment opportunities.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end at mine closure, reducing the monetary income of individuals and operation-related businesses.

With any activity where invasive tasks will take place, such as site clearance and constructions, negative environmental impacts may arise. As part of the proposed projects, various impacts have been identified in Table 51 to Table 54. It is however clear from these tables that with the correct management measures in place these impacts could be managed successfully.

Decommissioning

The decommissioning activities are similar to what can be expected in the construction of the sites. However even with extensive mitigation, latent impacts on the receiving environment are deemed highly likely, specifically in terms of the ecological impacts.

The following key positive impacts are foreseen:

- The lawful construction of the activities will allow the mine to operate within the legal realm of the Environmental Legislation;
- The exploration activities will allow to the mine to understand the underground resources and therefore plan the mining operations to mine the resource optimally, which is a legal requirement in terms of the MPRDA;
- Understanding the underground resources and mining optimally may result in a longer life of mine, which will fulfil the economic requirements of the municipal IDP, as well as allow for long term employment;
- The expansion of the Product Stockpiles will allow the mine to optimally supply to market demands;
- The development of an additional receiving Truck Parking will solve logistical constraints currently experienced with the current Truck Parking and trucks having to part on the regional roads. This project will not only allow efficient internal operations within the mine, but will also improve safety on the roads;
- The upgrade of the various activities will ensure that the mining environment is safe and well designed to optimise the mining operations;
- The diesel storage area decommissioning and reconstruction will allow the mine to make use of a trusted service supplier, and the project will further ensure that all diesel bunds and infrastructure are

designed based on the latest acceptable standards. Sustainable supply of fuels to the underground operations on the Northern Mine will also be possible with the approval of this project; and

- 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.

With any activity where invasive tasks will take place, such as site clearance and construction, negative impacts may arise. As part of the proposed projects, various potential impacts have been identified in Table 51 to Table 54.

1.g.v.5 The possible mitigation measures that could be applied and the level of risk

Specialist studies have been undertaken to assess each of the project areas in detail, in order to determine the possible impacts and associated management measures required. Detailed mitigation measures and recommendations have been included into this EIA report. Please refer to Table 51 to Table 54 for management measures which will be further assessed and confirmed by the specialist investigations. Some of the key management measures currently foreseen include:

1.g.v.5.a Logistics and General Management

- A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised.
- All necessary tree removal permits must be obtained.
- The WUL must be applied for and be available on site at all times.
- Early consultation should be initiated with Two Rivers Platinum Mine, prior to exploration activities, to determine the requirements of both parties.
- An open channel of consultation must be maintained throughout the exploration process.
- 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.
- Exemption in terms of GN704 (Regulation 4 and 5) should be obtained from the DWS for the placement of infrastructure as well as for the use of the discard rock in the construction of the proposed activities.

1.g.v.5.b Water Management

- Clean and dirty water separation as part of a Storm Water Management Plan 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.
- Placement of exploration pads 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.
- No drilling activities may take place within an agreed buffer (DWS to stipulate) between the Richmond Dam and the drilling activities.
- The truck parking itself should remain at all times outside of the 1:100 year flood line of the watercourses.
- The temporary low level bridge crossings should be managed in terms of erosion by the implementation of the correct erosion protection measures.
- Trucks should be well maintained, and any truck not in proper condition which could impact on the wetland or hydrological system of the site should be subjected to a warning system and fines.
- Water levels in the reservoir should be monitored and maintained at a 0.8m freeboard.
- Monitoring must be undertaken in line with the WUL.
- Only biodegradable drill mud may be used in the drilling activities.
- No water may be abstracted from the river system or groundwater resources unless authorised and any water required for exploration activities will be trucked in.
- When using discard rock for construction purposes, it is recommended that the rock from the Discard Storage Facility be utilised as these indicated that all elements were below the LC limits.

- Hydrocarbons, chemicals and hazardous waste should be stored in suitably sized bunded areas, with a capacity not less than 110 percent of what is stored therein.
- Annual update of the numerical groundwater model should be undertaken to assess the potential impact of the undermining of the rivers, the first update must be undertaken when the new mine plan is available.

1.g.v.5.c Storm Water Management

The proposed Storm Water Management Plan (SWMP) focussed on two key areas:

- The access roads, particularly those located on steep terrain; and
- The drilling sites.

For the access roads, it is proposed that berms are constructed across the width of the road, at a 30° to 40° angle (Figure 76). Material for the berms can be sourced from the discard rock, road cuts, depending on the soil type. The berms should extend well beyond the width of the road, particularly on the downslope side, and it should be ensured that runoff is discharged into a well vegetated or stony area, to prevent erosion. The berms should be constructed to be gradual, in order to allow vehicles to easily pass over them, but should not be overtopped by runoff. Berms should be prioritised at the top of steep transitions in the road slope, as well as above drainage line crossings.

Figure 76: Proposed positioning of berms across an access road

Table 50: Recommended berm spacing

Road Slope	Approximate Berm Spacing
2 %	75 m
5 %	40 m
10 %	25 m
15 %	20 m
20 %	15 m
30 %	10 m

It is proposed that the drilling sites are managed as closed dirty areas, through the implementation of berms, with all site runoff reporting to the portable sump. Clean upslope runoff must be diverted around each site. A proposed theoretical SWMP for the drilling sites is indicated the following figure.

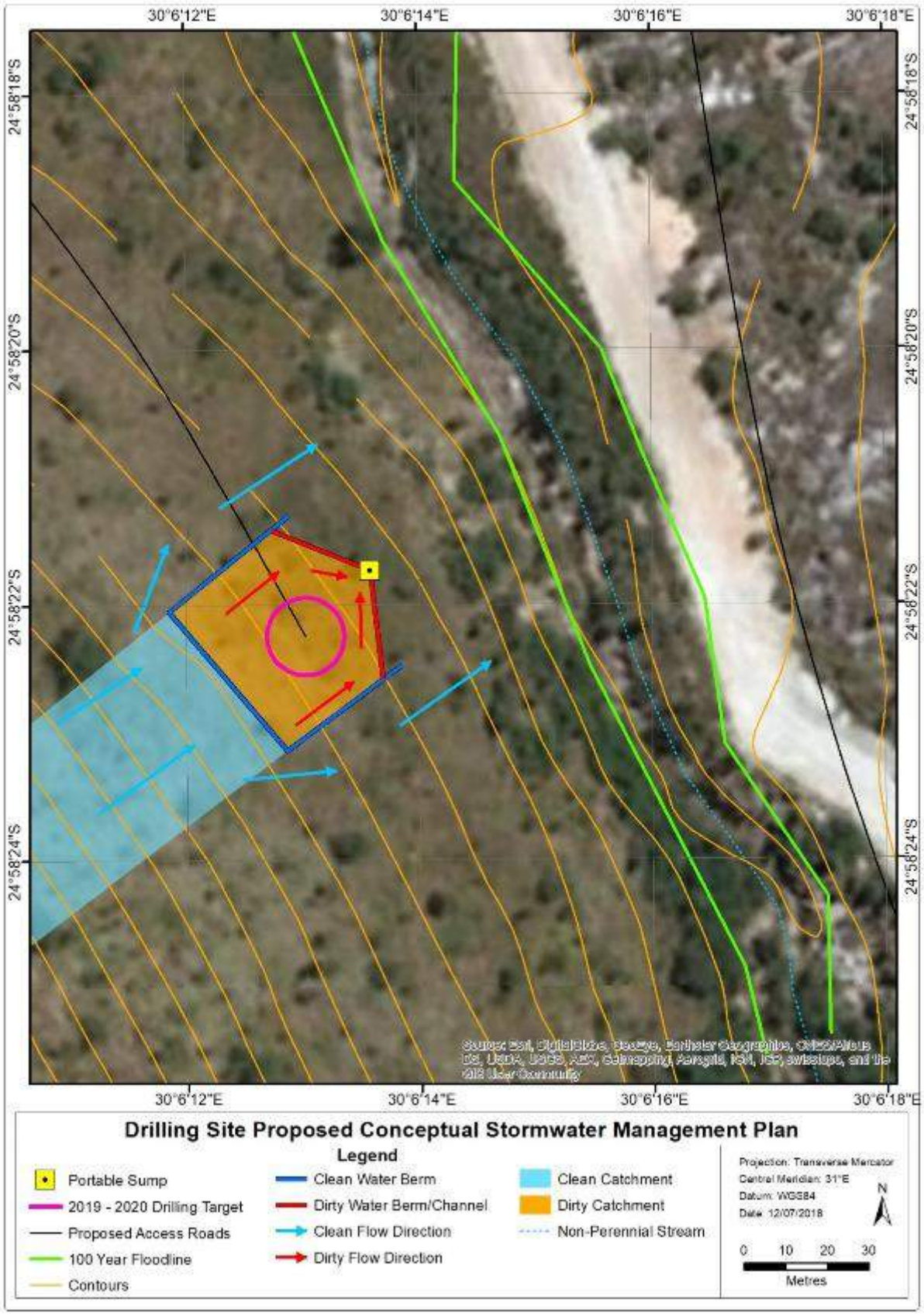

Figure 77: Proposed conceptual SWMP for the drilling sites

The following is recommended:

- During the construction and operational phases of the proposed projects, erosion berms should be installed on roadways to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms:

  - Where the track has slope of less than 2%, berms every 50m should be installed;
  - Where the track slopes between 2% and 10%, berms every 25m should be installed;
  - Where the track slopes between 10%-15%, berms every 20m should be installed; and
  - Where the track has slope greater than 15%, berms every 10m should be installed.
- Storm water berms must be constructed immediately during the construction phase. Material can be sourced from site clearance as well as from the access road cuts;
- Monitor all drainage systems for erosion and incision;
- Adequate storm water management must be incorporated into the design of the proposed project in order to prevent erosion and the associated sedimentation of the riparian and instream areas. In this regard special mention is made of:
  - Sheet runoff from cleared areas, paved surfaces and access roads needs to be curtailed; and
  - Runoff from sealed surfaces should be slowed down by the strategic placement of berms.
- All overburden stockpiles and waste stockpiles must have berms and/catchment paddocks at their toe to contain runoff from the facilities;
- The portable sump should be placed at the lowest but closest point to the drilling site, to ensure that all dirty water from the site drains towards the sump;
- The portable sump must be of an adequate size to contain runoff from the drilling sites. The water levels within the sump must be inspected regularly, and dirty water removed to allow adequate freeboard at all times;
- The access roads and drilling sites should be inspected regularly for erosion. Erosion rills and gullies should be repaired immediately. Causes of erosion should be determined and mitigated, to prevent future erosion of repaired areas;
- Diesel/ lubrication/ oils must be stored in a bunded area;
- Drainage lines should only be accessed in the dry season. Disturbance to drainage lines should be kept to a minimum; and
- Rehabilitation of the each site should be undertaken immediately.

1.g.v.5.d Soil Management

- Soil Management (General):
  - Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMPr (Soil Utilisation Guideline). Note to specifically separate stripping, stockpiling and replacing of soil horizons [A (0-30cm) and B (30-60cm)] in the original natural sequence to combat hardsetting and compaction, and maintain soil fertility. Prior to construction of the roads the soil will be stripped and placed on a soil stockpile.
  - Remove at least 30cm of soil or until hard rock is reached.
  - Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure.
  - The Topsoil Management Plan (2016) should be implemented on all topsoil stockpiles immediately to ensure that the integrity of the soils are maintained.
  - Any new topsoil stockpiles should not exceed the recommended height in terms of the Topsoil Management Plan (2016) of 2-4m. Where exceedance is present on existing facilities, erosion control measures should be implemented and vegetation establishment should be encouraged to assist in maintaining the structure of the soils for rehabilitation. Note specifically that should 3m heights be exceeded, erosion control measures should be implemented.
  - 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.
  - Temporary berms can be installed around stockpile areas whilst vegetation cover has not established to avoid soil loss through erosion; and
  - The recovered soils should be re-used to rehabilitate the mine footprint following mine closure as well as for concurrent rehabilitation where undertaken.
- Soil Erosion:
  - The footprint of the proposed drilling pads and infrastructure areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible;

- If possible, vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when the erosive storm water and wind are anticipated to be low;
- 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;
- All disturbed areas adjacent to the infrastructure areas can be re-vegetated with an indigenous grass mix, if necessary, to re-establish a protective cover and to minimise soil erosion and dust emission; and
- Temporary erosion control measures may be used to protect the disturbed soils during the construction phase until adequate vegetation has established. This is regarded as critical for the southern portion of the Mining Right Area where erosion is currently occurring, and is anticipated to worsen during vegetation clearing, drilling and exploration activities.

- Soil Compaction:
  - Capital Project laydown areas should be located within disturbed soils (anthrosols) to avoid compaction of natural soils;
  - Vehicles may not travers natural areas and remain on existing disturbed areas as far as practically possible;
  - If possible, vegetation clearance and commencement of construction and exploration activities, particularly along the Dwarsrivier System, 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;
  - If possible, vegetation clearance, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low to avoid surface crusting and sealing of exposed soils;
  - Direct surface disturbance of the identified high clay content/wetland (i.e. Acardia, Rensburg and Alluvial) soils should be limited within demarcated areas where possible to minimise the intensity of compaction due to the susceptibility of these soils to prolonged waterlogging conditions (inundation); 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 EMPr 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;
  - A spill prevention and emergency spill response plan should be compiled to guide the construction works; and
  - An emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur.
- Soil Loss and Land Capability:
  - Drilling pads within the fallow/ old agricultural lands (not earmarked for future development) should be avoided since these soils can be used for Lucerne grass cultivation for grazing.
  - During the decommissioning phase the development footprint areas should be thoroughly rehabilitated, and all building material should be removed to a suitable disposal facility;
  - The development footprints should be ripped to alleviate compaction;
  - Stored topsoil should be replaced and the footprint graded to a smooth surface;
  - The landscape should be backfilled and reprofiled to mimic the natural topography for potential agricultural activities and grazing opportunities post-mining. If possible, ensure a continuation of the premining surface drainage pattern;
  - Slopes of the backfilled surface should be gradual since abrupt changes in slope gradient increase the susceptibility for erosion initiation;
  - The topsoil should be ameliorated according to soil chemical analysis;
  - The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation. Soil amelioration should be done according soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation; and

- The development footprint areas should be re-vegetated with a grass seed mixture as soon as possible, preferably in spring and early summer to stabilise the soil and prevent soil loss during the rainy season.

- Prior to the removal of plant species, the mine should appoint an ecologist to mark all species and ensure that the necessary permits are obtained. An ecologist must monitor and oversee the removal of all identified protected species, which should be removed under tree and plant removal permits from DAFF and LDEDET respectively.
- All such species should be demarcated by signage or tape.
- Alien and invasive plant eradication and control should be implemented on site.
- Equipment must be well maintained to reduce excessive noise creation.
- Where vegetation cannot be established during the life of construction and operations, appropriate measures 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.

1.g.v.5.e Ecological Habitats (flora)

In order to minimise the impact to floral species, the following recommendations are made:

- All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling.
- Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities;
- Drill pads are to be located outside of the freshwater habitats and the associated buffer zones as presented in 1.k.ii. All drill pads and access roads are to be rehabilitated after drilling activities;
- Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible;
- Storm water must be suitably managed and mitigated in order to ensure sedimentation of the freshwater habitats does not occur;
- Where drill pads are located in close proximity to the freshwater habitats and associated buffer zones temporary berms are to be constructed in order to ensure that sediment laden runoff from the drill sites does not enter into the freshwater systems;
- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance
- Spills and /or leaks from drill equipment must be immediately remedied and cleaned up so as to ensure that these chemicals do not enter into the freshwater habitat;
- An Alien and Invasive Plant Control Plan and Erosion Control Plan must be developed and implemented during all phases of development, to lower the risk of erosion and the increase proliferation of alien and invasive plant species within the project areas;
- 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 revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission; and
- Permits should be obtained from LDEDET and DAFF to remove, relocate or destroy any protected plant species before construction of infrastructure takes place.

The following protected species listed under the National Forests Act (Act 84 of 1998) were observed within the focus area at the time of the assessment:

- *Sclerocarya birrea subsp. caffra;* and
- *Lydenburgia cassinoides* (also listed as Near Threatened in terms of the National Red List).

Furthermore, *Balanites maughamii*, also listed as protected under the National Forest Act (Act 84 of 1998), although not observed during the field assessment has an increase probability of occurring within the Sekhukhune Mountain Bushveld habitat unit.

In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DAFF a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including field assessments) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines.

Additionally, two species listed as protected under the LEMA (Act 7 of 2003) were observed during the field assessment namely:

- *Aloe marlothii*; and
- *Aloe castanea*.

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 LDEDET.

The following additional floral SCC were recorded during previous studies (BEC, 2013) (Ecorex, 2008) undertaken in the Mining Right Area and have a high probability to be present within the Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units as preferred habitat for these floral SCC are present:

- *Boophone disticha* (Declining Status, Poisonous, medicinal uses);
- *Boscia foetida* (Medicinal uses, LEMA, Schedule 12 Protected Plants);
- *Chlorophytum* cf. *cyperaceum* (LEMA, Schedule 12 Protected Plants);
- Elephantorrhiza praetermissa (LEMA, Schedule 12 Protected Plants);
- *Euphorbia* species (LEMA, Schedule 12 Protected Plants);
- *Gladiolus* species (LEMA, Schedule 12 Protected Plants);
- *Ledebouria* (*Resnova*) sp.aff. *megaphylla*; and
- *Zantedeschia pentlandii* (Listed as Vulnerable in terms of the National Red List).

Alien floral species located in the project areas must be removed on a regular basis as part of maintenance activities according to the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations (GN R864 of 2016).

1.g.v.5.f Faunal Habitat

Mammals:

In order to minimise the impact to mammal species, the following mitigation measures are recommended:

- All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post-drilling;
- Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities;
- No drill pads are to be located within any freshwater systems or their associated buffer zones as presented in Section 1.k.ii, this will ensure the continued protection of these systems and the mammal species they support through habitat and resource provision; and
- Drill pads located in open grassed areas along the Klein and Groot Dwarsriviers, notably in areas of deeper soil must be searched for any signs of mole activity. Should such be found, a suitably qualified specialist is to be contacted in order to advise on the best way forward based on the analyses of the type of moles present. During this time, drilling and vegetation clearance is cease immediately in the area.

Avifauna

In order to minimise the impact to avifaunal species, the following mitigatory actions are recommended:

- All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling.
- Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities;
- Removal/ cutting down of large trees (>4m) should be avoided, notably in the riparian areas, valleys between mountain slopes and along the mountain sides, as these are considered important for large raptors, and cannot be readily replaced through rehabilitation;
- No drill pads are to be located within any freshwater systems or their associated buffer zones as presented in Section 1.k.ii, this will ensure the continued protection of these systems and the avifaunal species they support; and

- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.

Amphibians:

In order to minimise the impact to amphibian species, the following mitigatory actions are recommended:

- Drill pads are to be located outside of the active channel of the rivers and their associated riparian zones and as well as a 32m buffer zone. All drill pads and access roads are to be rehabilitated post drilling activities;
- Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible;
- Storm water must be suitably managed and mitigated in order to ensure sedimentation of the freshwater habitats does not occur;
- Where drill pads are located in close proximity to the freshwater habitats and associated buffer zones temporary berms are to be constructed in order to ensure that sediment laden runoff from the drill sites does not enter into the freshwater systems;
- Spills and /or leaks from drill equipment must be immediately remedied and cleaned up so as to ensure that these chemicals do not enter into the freshwater habitat; and
- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.

Reptiles

In order to minimise the impact to mammal species, the following mitigations are recommended:

- All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling;
- Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities;
- Drill pads should avoid rocky outcrop and areas of sheet rock as far as practically possible, as these are primary habitat for the reptile SCC *Platysaurus orientalis fitzsimonsi* (Fitzsimon's Flat Lizard); and
- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.

Insects

In order to minimise the impact to amphibian species, the following mitigations are recommended:

- Drill pads are to be located outside of the freshwater habitats and the associated buffer zones as presented in Section 1.k.ii;
- All drill pads and access roads are to be rehabilitated post drilling activities;
- Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible;
- Drill pads and access roads are to avoid areas where stands of *Vitex obovata* subsp *wilmsii* are located. Where drill pads and access roads are located within stands of *Vitex obovata* subsp *wilmsii*, these should be relocated to an area outside of these stands. These trees are often associated with the drainage lines and as such avoidance of these areas will ensure that the risks posed to *Pycna sylvia* are reduced; and
- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.

Arachnids

In order to minimise the impact to arachnid species, the following mitigatory measures are recommended:

- All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling;
- Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities;
- Drill pads should avoid rocky outcrops and areas of sheet rock, as these are primary habitat for arachnid SCC such *Hadogenes polytrichobothrius*;
- Prior to vegetation clearing activities in the Sekhukhune Bushveld habitat, the sites should be inspected for the presence of baboon spider burrows. If located, these species should be carefully excavated by a suitably qualified specialist ensuring no harm to the spider, and relocated to similar surrounding habitat outside of the footprint area; and

- As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.

Species of Conservational Concern

The Capital Project areas have been impacted in areas as a result of the development and expansion of mining related infrastructure as well as associated mining activities. Furthermore, communities do have access to some of the areas in which the graze their cattle, although the impact from this is considered to be low as only a few cattle appear to be present. Past agricultural activities and current mining and exploration activities have had the largest impact in the surrounding habitat and faunal species composition. The construction of fences has impact upon larger faunal species movement, however, it was observed that faunal species are making use of the under road culverts as access corridors between fenced areas.

The drill pads and new access roads will pose the greatest threat to faunal SCC, notably through disturbance and loss of niche habitat. Drilling in the Sekhukhune Mountain Bushveld poses a significant threat to small SCC such as *Platysaurus orientalis fitzsimonsi* and *Hadogenes polytrichobothrius* which are restricted to the rocky outcrops and sheet rock areas. Drilling in the riparian areas and associated ecotonal areas of the Riparian and Sekhukhune Bushveld areas poses a further risk to species such as *Chrysospalax villosus* as well as the freshwater systems and associated species which rely on this habitat. Clearing of large trees in drill pad areas will further result in the loss of roosting and nesting sites for raptors. Many of the drill pad locations will require the clearing of *Vitex obovata* subsp *wilmsii,* a tree species which has been associated with the Cicada species *Pycna silvia*. This may have a significant negative impact on the current population of this species in the Klein Dwars Valley.

1.g.v.5.g Freshwater and Aquatic Environment

- Capital Projects
  - The footprint areas of all surface infrastructure (truck parking area, security office, low grade stockpiles etc.) must remain as small as possible within the parameters of operational and engineering requirements. It is strongly recommended that during the planning phase, layout and positioning of infrastructure take into consideration the locality of the delineated freshwater resources and the associated zones of regulation and as much as feasible, layouts planned around these;
  - Throughout the life of mine, non-essential personnel and non-essential vehicles are not to be permitted within the demarcated floodplain or riparian zones. Special care must be taken to ensure that no waste relating to the construction or mining process is disposed of within the freshwater and aquatic habitat;
  - As far as possible, mining surface infrastructure (including soil stockpiles and any temporary structures) must remain out of the delineated floodplain/ riparian zones and associated zones of regulation in line with the requirements of NEMA and Regulation GN704 of the NWA. Any activities which encroach on riparian and aquatic habitat must be authorized by the relevant authorities, and such activities must be strictly managed in a responsible manner in line with the mitigation hierarchy as advocated by the DEA *et al.* (2013); and
  - Limit the footprint area of the construction activity (including the placement of temporary infrastructure) to what is absolutely essential in order to minimise the loss of clean water runoff areas and loss of catchment yield which recharge the receiving freshwater environment.
- Exploration Drilling
  - The delineated floodplain and riparian zones associated with all the identified drainage systems within the Mining Right Area must be taken into consideration during the planning phase. The initial layout provided by the proponent indicates several drilling sites are planned within the delineated floodplain/riparian zones and in some instances, within active channels of systems. Drilling activities within these areas is likely to have an unacceptably high cumulative impact on the drainage systems and it is therefore strongly recommended that no drilling be permitted within these areas;
  - No drilling should be permitted within 32m of any active channel of any watercourse, in consideration of NEMA regulations; and
  - Access roads must not be developed in parallel to the watercourse but must enter at the shortest distance from the adjacent areas above the flood line. Furthermore, the same entry and exit track should be used and no additional disturbance should take place.
- General:

- Measures to contain and reuse as much water as possible within the mine process water system should be undertaken. Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised;
- Limit the footprint area of construction activities in order to minimise the loss of clean water runoff areas which recharge the receiving freshwater / aquatic environment;
- The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment;
- No dirty water runoff (as defined by Regulation GN704) must be permitted to reach the freshwater resources during the entire life of mine, and clean and dirty water management systems must be maintained and operated efficiently to prevent any contaminated runoff from entering the receiving aquatic environment. Clean and dirty water runoff separation systems should be implemented in accordance with the approved SWMP or EMPr. Clean and dirty water runoff separation systems should be developed before the development of any other infrastructure takes place;
- Ensure that the mine's water systems are managed in such a way as to prevent discharge to the receiving environment and to prevent discharge of dirty water. All dirty water containment structures should be designed to contain a minimum storm event of a 24 hour, 1 in 50 year flood event. These containment facilities must remain outside of the defined freshwater resources (floodplain and riparian areas) and the respective zones of regulation, as far as possible, as a measure to minimise the impact on the receiving environment;
- All pollution control facilities must be managed in such a way as to ensure that storage and surge capacity is available and that the water balance is managed to prevent decant if a large rainfall event occurs;
- Implement measures to contain seepage as far as possible to prevent contamination of the groundwater regime, and any recommendations made in this regard in the groundwater specialist study must be implemented;
- All facilities intended for the storage of process water should be lined with a suitable HDPE liner;
- No dumping of waste should take place within the freshwater resources. If any spills occur, they should be immediately cleaned up;
- Upon closure all haul and access roads as well as all unnecessary mining infrastructure should be removed in order to minimise the impacts on the aquatic resources of the area beyond the life of mine;
- Strict monitoring throughout the life of mine and post-closure is required in order to ensure the ecological integrity and functioning of freshwater resources is retained. Monitoring data must be utilised proactively to identify any emerging issues;
- Demolition footprint must be clearly demarcated and no related activities, including the movement of vehicles, must be permitted to occur outside of the footprint area;
- All related waste and rubble must be removed from site and disposed of according to relevant SABS standards. No waste must be permitted to enter freshwater resources;
- Edge effects such as erosion must be monitored and managed;
- All areas affected by stockpiling during the operational phase of the mine should be rehabilitated and stabilised using cladding or a suitable grass mix to prevent sedimentation of the freshwater resources in the area;
- Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, a clean water diversion system may remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible;
- Upon closure all haul and access roads which are no longer required, as well as all unnecessary mining infrastructure (including temporary structures) should be removed to minimise the impacts on the aquatic resources of the area beyond the life of mine. Compacted soils should be ripped and revegetated with indigenous vegetation to prevent erosion, sheet runoff, and discourage the establishment of alien floral species post-closure;
- 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;

- All affected areas should be resloped and dressed with topsoil where necessary and reseeded with indigenous grasses;
- It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected;
- Ongoing aquatic biomonitoring should take place throughout the closure phase of the mine and should continue into the post closure phase to define latent impacts that need to be mitigated;
- Based on the outcomes of the specialist study, the activities have been excluded from the 1:100 year flood lines as well as 32m of riparian zones, whichever is the greatest (refer to Section 1.k.ii.1.a.2. The impact assessment was therefore undertaken on this basis, i.e. that the exploration drilling pads would not be located within the active channels, delineated flood line or delineated riparian zones of the freshwater resources.
- Where necessary WULs will be applied for and GN704 exemptions will be applied for activities within 500m from a wetland area or 100m from a watercourse.

1.g.v.5.h Heritage Resources

- In terms of the exploration programme two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50m buffer zone around the sites.
- The well-known geological monument referred to as the "Dwarsrivier National Monument" is located close to some of the drill pads and will have to be preserved with a buffer zone of 100m. No further mitigation prior to construction is recommended in terms of the archaeological and paleontological components of Section 35 of the NHRA for the proposed development to proceed.
- In terms of the built environment of the area (Section 34 of the NHRA), no standing structures older than 60 years occur within the impact areas for the Capital Projects and Diesel Storage (including decommissioning of existing facilities). Several buildings were however identified from the desktop study close to drill pads and should be avoided with a 30m buffer zone.
- In terms of Section 36 of the NHRA several burial sites are known to exist in the larger project area. However no burial sites are on record for the areas of impact. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation. The area is extensively mined and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns was raised.

1.g.v.5.i Waste Management

- 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 contaminated material at the Exploration Activities must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur.
- 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.
- Any significant spills must be captured in the incident reports and must be reported to the relevant department (LDEDET/ Catchment Management Agency (CMA)/ DWS).
- Pipelines transporting fuels must 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.

1.g.v.5.j Air Quality Management

- Tarpaulins will be placed over all vehicles transporting product.
- Dust Suppression will be undertaken where required.

Please refer to Table 15 on page 98 of this report for the comments received by stakeholders and how these have been addressed.

Please refer to Table 51 to Table 54 for a broken down list of all management measures currently foreseen.

1.g.v.6 Motivation where no alternatives sites exist

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

1.g.vi Statement motivating the preferred site

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

1.h Full Description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred site

In order to identify the potential impacts associated with the proposed activities the following steps were undertaken:

The stakeholder consultation process is undertaken in a manner to be interactive, providing landowners and identified stakeholders with the opportunity to provide input into the project. This is a key focus, as the local residence have capabilities of providing site specific information, which may not be available in desktop research material. Stakeholders are requested (as part of the BID) to provide their views on the project and any potential concerns which they may have. All comments and concerns received to date, have been captured and formulated into the impact assessment.

Previous Environmental Studies have been undertaken for a number of projects for Dwarsrivier Mine within the study area, these include the MPRDA, EMPr, EMPr Alignment, various Basic Assessment Processes, etc. on the portions of land applicable to this project. The baseline studies and impact findings, were incorporated into the development of the draft EIA report compilation.

- A detailed desktop investigation was undertaken to determine the environmental setting in which the project is located. Based on the desktop investigations various resources were used to determine the significance and sensitivity of the various environmental considerations. The desktop investigation involved the use of:
  - South African National Biodiversity Institute (SANBI) Biodiversity Geographic Information System (BGIS) Land Use Decision System (LUDS);
  - Geographic Information System (GIS) base maps;
  - DWS (previously the Department of Water Affairs/ Department of Water Affairs and Forestry) information documents such as the ISP and Groundwater Vulnerability Reports;
  - AGIS;
  - Municipal Integrated Development Plan (IDP);
  - Consultation with the Department of Land Affairs.
- Additional site-specific specialist studies were conducted to determine the risk of the proposed project on the environment which included:
  - Terrestrial Ecological Assessment;
  - Freshwater and Aquatic Assessment;
  - Ground Water Assessment;
  - Floodline delineation;
  - Desktop Storm Water Management requirements;
  - Soil and land use assessment; and
  - Heritage Assessment.
- Specialist site visits were undertaken between April and July 2018. This site visits were utilised to ensure that the information gathered as part of the desktop investigation reflects the current status of the land.
- Consultation with directly affected parties were undertaken – please refer to 1.g.ii.7 to ensure that concerns and queries in this regard are also addressed.
- The rating of the identified impacts was undertaken in a quantitative manner as provided in Section 1.g.v.2 (Impact Ratings). The ratings are undertaken in a manner to calculate the significance of each of the impacts. The EAP also assessed the outcomes of the calculation to determine whether the outcome reflects the perceived and actual views.

The identification of management measures are done based on the significance of the impacts and measures that have been considered appropriate and successful, specifically as Best Practical and Economical Options.

1.i Assessment of each identified potentially significant impact and risk

Please refer to Table 51 to Table 54 which presents the impacts assessed based on the Sections before. Please take note of the following abbreviations when assessing the tables:

- SbM: Significance before Mitigation
- SaM: Significance after Mitigation
- CbA: Can be Avoided
- R: Reversible
- Ir: Irriplaceble

Table 51: Potential Impacts and the calculated significance before and after management measures – 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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Planning Phase																	
Legal Requirements (Environmental Permits)	1, 2, 3	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 internal audits must be undertaken during the construction phase, where after biannual (twice a year) internal audits can be undertaken (after construction), on the lawful implementation of the Environmental Authorisation. A copy of the 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. Where access roads crossings are required the necessary NWA approvals should be obtained and the recommendations in the Aquatic Specialist Report, July 2018 should be adhered to; • No activities of 10m² and more may be undertaken within 32m of the riparian zone unless approved in terms of the NWA and NEMAs; • Restriction of the Bonheim soils; • 100m buffer around the Richmond Dam • In terms of the exploration programme, two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50m buffer zone around the sites; • The well-known geological monument referred to as the "Dwarsrivier National Monument" is located close to some of the drill pads and will have to be conserved with a buffer zone of 100m; and • Several buildings were identified from the desktop heritage study close to drill pads and should be avoided with a 30m buffer zone. Other considerations would also be: • To limit any permanent structures on sensitive soil types, such as the Hutton, Arcadia, Rensburg and Bonheim forms	P	4	3	5	5	17	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										(refer to Figure 29 and Figure 30). The impact on these soils have been reduced significantly be excluding the 1:100 year flood lines from the drilling activities. It is important that the project team ensure that these soils are also avoided as far as practically possible with the construction of the temporary access roads. The Capital Projects should not have any negative impacts on the soils. • Where roads are required for temporary access roads to the drill pads, these should not include excavations of more than 10m^2 where possible within 32m of watercourses unless approved in terms of the NEMA and NWA; • No new roads may be constructed within the main river systems (Groot and Klein Dwarsrivier, as well as the Dwarsrivier, or the Springkaanspruit); • Only existing access roads will be used in the Sekhukhune Mountain Bushveld areas, with specific mention of the steep slopes. Outcorops will be restricted from activities. Where absolutely necessary, tie offs from the existing exploration roads will be constructed to access specific drill points (excluding outcrops again), but these will be designed to be kept to the absolute minimum; • Where possible drilling in the rocky outcrops (refer to Figure 29) should be avoided if possible, and where critically required the establishment of drill pads should be undertaken in such a manner as to fully rehabilitate this area. • Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities. • Activities on fallow lands should be avoided. The area where some drilling (about four boreholes) are planned, are linked to the already approved extension of the Discard Storage Facility footprint and a future Eskom Substation. Any drilling should in these areas be limited to the approved footprints of future infrastructure and not on areas not earmarked for clearance. • Removal and or destruction of protected and sensitive species (see Figure 58 and Figure 59), especially the							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										Lydenburgia cassinoides, must be avoided at all costs. These species must be demarcated during the planning phase and excluded from any activities or where required specific permits must be obtained where unavoidable. Specific attention should be given around the Truck Parking area, the northern portion of the exploration drilling area, and the south western corner of the exploration drilling area. 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 revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission. Please refer to the final draft site map presented in Section 1.k.ii of this report. Note that as part of the exploration programme some of the drilling points may be relocted. However, these relocations will be subject to the above mentioned restrictions. The mine's legal register must be updated to indicate all activities associated with Environmental Authorisations.							
Relocation of Privately and State (Eskom) Owned Powerline if required around the North Mine Infrastructure Project.	2	Socio-Economic	The relocation of the powerlines, should this be required (applicant owned and/or Eskom owned) could temporarily disrupt Economic Activities in the area which the powerline supplies.	N	-3	-1	-4	-4	-12	The mine should obtain approval from Eskom and affected parties regarding the relocation of the powerlines. The mine should enter into discussions with Eskom and the affected parties to develop an operating procedure and time line for the removal of the powerlines. The powerlines may not be removed without the required approvals by Eskom.	-	-1	-2	-1	-2	-5	CbA
Land Claims	Unknown	Socio-Economic	According to the Fetakgomo-Greater Tubatse municipal IDP there are land claims present on the farm Dwarsrivier 372KT. The exact portions are unknown, and a request to the Department of Land	N	-3	-3	-4	-4	-14	The mine should obtain clarity on the status of the land claims which 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	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			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.														
Planning the layout of the Exploration Drilling Activities	1	Landowner Relationships	Unlawful access to land or mining activities	N	-3	-2	-4	-4	-13	Early consultation to determine the requirements of both parties. An open channel of consultation must be maintained throughout the process. The Dwarsrivier Chrome Mine Exploration Geologist must undertake a site walkover, with the responsible Two Rivers Platinum Mine representative to determine buffers and no go areas around Two Rivers Platinum Mine infrastructure. The Standard Operating Practices (SOP) and/or contactor's SOP for surface exploration drilling must be submitted to Two Rivers Platinum Mine prior to commencement of drilling activities. Where conflict arise the Department of Mineral Resources (DMR) must be involved to facilitate consultation processes.	-	-1	-1	-1	-1	-4	CbA
	1	Ecology, hydrology and freshwater resources.	Potential poor planning leading to excessive or unnecessary clearing of vegetation outside of the demarcated	N	-3	-2	-4	-4	-13	Clearly demarcate the areas planned for construction in line with the sensitivity maps. Identify existing roads which could be used to access drill pads. No drill sites/ drilling pads may be constructed within the 1:100-year flood line or within 32m from a riparian zone (whichever is the greatest).	-	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			infrastructure areas and access roads. Placement of drill pads in niche habitat and areas of increased sensitivity. Several proposed drill sites were initially located directly within, or less than 10m from, the active channels of: the Groot Dwars, Klein Dwars and Dwars Rivers, the unnamed tributary of the Klein Dwars River, and two of the western ephemeral drainage lines. Additionally, some temporary roads may be located within the 32m buffers and/or 1:100 year flood lines associated with these systems, as well as within the flood lines of the three primary river systems.							Where roads are required, existing roads should firstly be utilised. If new roads are required these should be designed in line with the stipulations of the specialists: • No access roads should be planned parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. • For the access roads, it is proposed that berms are constructed across the width of the road, at a 30° to 40° angle. A search must be undertaken prior to clearance for indigenous plants that can be carefully removed and stored for rehabilitation.							
	1	Heritage	Various heritage resources have been demarcated.	N	-3	-2	-4	-4	-13	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.	-	-2	-1	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										It is key to note that the outcomes of this EIA are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensures that the exploration drilling is undertaken in a manner that will ensure non-negotiable safety standards in future mining development. Where exploration activities result in the encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation. All activities should remain within areas as agreed in the approved contracts. A list of contact people and responsible parties should be finalised.							
Truck Parking, Roads and Transportation	2	Landowner Relationships	Impact on Mining operations of applicant as well as Two Rivers Platinum Mine.	N	-3	-2	-4	-4	-13	Early consultation to determine the requirements of both parties (Dwarsrivier Mine and Two Rivers Platinum). Development of a logistic schedule that will be to the advantage of both Dwarsrivier and Two Rivers Platinum Mines in terms of the transportation of workers via bus and product via truck. An open channel of consultation must be maintained throughout the process. Initiate discussions with the relevant Roads Agency to determine design requirements of the road.	-	-1	-1	-1	-1	-4	CbA

Table 52: Potential Impacts and the calculated significance before and after management measures – 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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/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 (Truck Parking, Laydown, Low Grade Stockpile, Topsoil Stockpile)	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. However, around the exploration sites, these areas will also be placed around more steeper, mountainous areas.	N	-1	-3	-3	-2	-9	The footprint areas of all surface infrastructure (truck parking area, security office, low grade stockpiles etc.) 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 proved insufficient for control, these shall be replaced by fencing. Where possible the exploration activities must avoid the rocky outrops as recommended by the ecologist studies. Designs of the facilities (stockpiles and landscaping) must be undertaken by a competent person. 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. This is regarded critical for the southern portion of the Mining Right Area where erosion is currently occurring, and it is anticipated to worsen during vegetation clearing, drilling and exploration activities. 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. Exploration activities must remain outside of the 1: 100 year flood lines, where this is not possible, the required approval	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										must be obtained from the DWS and activities should further be restrained to the dry season. Access roads for the exploration drilling sites should be limited by utilising existing roads. Where new roads are constructed the necessary approvals in terms of Section 21c&i, should be obtained through the DWS. Note that any excavation of more thatn 10m^2, will require an Environmental Authorisation in terms of the NEMA if this is undertaken within 32m of a watercourse. Where access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle and the necessary erosion controls must e implemented.. Linear infrastructure must as far as practically possible follow the natural contours of the area.							
	1, 2 (Truck Parking, Laydown, Roads, Low Grade Stockpile, Topsoil Stockpile)	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	Drilling pads within the fallow lands, not currently licensed and/or approved for future developments (such as the Discard Storage Facility expansion and new Eskom substation), should be avoided since these soils can be used for Lucerne grass cultivation for grazing. Alternatively, drilling pads should be placed adjacent to the fallow lands. Should this be not feasible, the footprint of should be restricted within the demarcated areas. Unnecessary disturbances of the potentially arable soils (i.e. Hutton, Bonheim) can be avoided where possible to minimise loss of arable soils. Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMPr (Soil Utilisation Guideline). Prior to construction of the road the soil will be stripped and placed on a soil stockpile. Separate stripping, stockpiling and replacing of soil horizons [A (0-30cm) and B (30-60cm)] in the original natural sequence to combat hardsetting and compaction and maintain soil fertility.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										At least 30cm of soils must be removed or until hard rock is encountered. Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure. The Topsoil Management Plan (2016) should be implemented on all topsoils immediately to ensure that the integrity of the soils are maintained. Where possible separate stockpiling of different soil type groups (to obtain the highest post-mining land capability) should take place. 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. 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. During the construction (and operational) phases of the proposed mining expansion erosion berms should be installed on roadways to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms: • Where the track has slope of less than 2%, berms every 50m should be installed; • Where the track slopes between 2% and 10%, berms every 25m should be installed; • Where the track slopes between 10%-15%, berms every 20m should be installed; and • Where the track has slope greater than 15%, berms every 10m should be installed. 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.							

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			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. As far as possible drill pads should be accessed through the existing road network. No access roads should be planned parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No permanent access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars and Springkaanspruit) and or identified drainage lines as per the floodline study (2018). Where temporary access roads are required, these must be constructed in line with the specialist recommendations as per the EMPr and should not involve the excavation of $10m^2$ or more without the necessary NEMA licenses. A site plan must be developed, indicating the following: • Location of all approved activities; • 1:100 year flood line; • Identified buffer around all watercourses; • All vegetation management zones as per the Biodiversity Action Plan. Laydown areas of expansion activities should be located within disturbed soils (anthrosols) to avoid compaction of natural soils. All contractors and subcontractors must receive induction. The induction should be updated on site, to make provision for consideration of the site plan and include a detailed explanation on the purpose of the no-go zones, presence of protected species, presence of the CBA and ESAs and the meeting of the EMPr conditions and requirements.. 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.	N	-1	-1	-2	-1	-5	R

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										All topsoil which is removed should be relocated to the demarcated topsoil stockpiles (in this case Topsoil Stockpile 4). In addition to this the topsoil stockpiles (#3) which will be relocated in the event of Option 2 of the Truck Parking, should be done in a manner as to protect the soils for future rehabilitation purposes.							
										Site clearance and activities should be restricted to the approved footprint. Contractor's and laydown areas should be established on already disturbed footprints.							
										Vegetation clearance and commencement of construction and exploration activities, particularly along the Dwarsrivier system, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low and less prone to compaction							
			Direct impact: 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. For the exploration activities, the SWMP identified for these activities by the 2018 specialist studies should be adhered to.	N	-1	-2	-2	-1	-6	R
										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 storm water and wind are anticipated to be low.							

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										Note that: Drilling within 1:100 year flood line will be avoided but if unavoidable must be approved by DWS.							
										The footprint of the proposed drilling pads and infrastructure areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible. This will be specifically important to protect any SCC species.							
										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.							
										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.							
										The mine will ensure that erosion controls are included in the designs of all linear infrastructure (roads, conveyors, low level bridge crossing, pipelines or open channels).							
	1, 2 (Truck Parking, Laydown, Topsoil Stockpile, Low Grade Stockpile, Roads), 3 (North Mine undergrou nd supply)	Terrestrial Ecology (Fauna & Flora)	A number of impacts have been identified as part of the ecological specialist study: • Site clearing and the removal of vegetation leading to a loss of sensitive floral habitat; • Excavation of soils leading to increased runoff and sedimentation of downslope habitat; • Dust generation during construction leading to a loss of floral habitat; • Runoff/disposal of concrete and construction materials from the layout areas into the surrounding habitat leading to surface hardening and limiting	N	-3	-3	-3	-4	-13	Adhere to the measures presented under soil impacts.	N	-1	-1	-1	-2	-5	CbA
										Adhere to the measures presented under hydrological impacts (especially by implementing storm water management measures).							
										Adhere to the management measures presented for air quality management.							
										Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities.							
										No drill pads are to be located within any freshwater systems or their associated buffer zones, this will ensure the continued protection of these systems and the species they support through habitat and resource provision.							
										Vegetation clearance and commencement of construction activities should either be scheduled to coincide with low rainfall conditions when erosive storm water is anticipated to							

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			recruitment of new vegetation; - Loss of floral diversity through invasion of alien species in disturbed areas; - Movement of construction vehicles and access road construction through sensitive floral habitat; - Compaction of soils reducing efficiency of floral re-establishment; and - Increased fire frequency during construction leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted for the Capital Projects: - Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); - Sekhukhune Bushveld: Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); - Transformed Habitat: Impact on floral habitat and species diversity (Low							be limited or alternatively storm water controls must be established at the start of construction and dust suppression implemented. As far as possible drill pads should be accessed through the existing road network The optimised footprint areas of the drill pads are to remain as small as possible and vegetation clearing must to be limited to what is absolutely essential and vegetation outside of the footprints is not to be cleared. This is specifically important to to avoid protected tree species and trees such as *Vitex obovata* subsp *wilmsii* which provide a food resource for threatened cicadas *Pycna sylvia*. During the surveying and site-pegging phase of the proposed mining activities, all floral Species of Conservation Concern (SCC) that will be affected must be marked and where possible, relocated (if possible and to be identified by a qualified ecologist) to suitable habitat surrounding the disturbance footprint. The relevant permits must be applied for within the relevant province as indicated in the baseline floral assessment, prior to the construction phase. Clearing of vegetation should take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential. Should any floral species protected under the Limpopo Environmental Management Act (LEMA) (Act 7 of 2003) and National Forests Act (Act 84 of 1998) be encountered within the proposed development footprint areas, permits should be obtained from LEDET and DAFF to remove, cut or destroy such species before construction of infrastructure takes place. Prior to the removal/ relocation of floral SCC, the mine should appoint an ecologist to monitor and oversee such activities, which may only take place under necessary permits. All such species should be demarcated by signage or tape prior to removal/ relocation and include species in the vicinity of activities which are to be avoided. If possible, vegetation clearance and commencement of construction activities can be scheduled to coincide with low							

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			if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated). The following significances should be noted for the Drilling Projects: • Sekhukhune Mountain Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat: (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium Low if							rainfall conditions when erosive storm water and windy conditions are anticipated to be low. 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 and to minimise soil erosion and dust emission. No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel. 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. Contractor's camps and laydown areas should be established on already disturbed footprints. All employees, or contractors on site, involved in the proposed projects, should receive a detailed induction on the expectations for the protection of fauna and flora on site. Alien and invasive floral species management and eradication should be implemented on site.							

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			unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species diversity): Very Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).														
			Direct impact: Displacement of faunal species and human/animal conflict. Due to the fact that the Capital Projects area 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 field site. Impacts may however occur around the Truck Parking areas and Exploration areas, which is less disturbed.	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. Note that in the event that that any protected species (Faunal SCC) are observed or identified, activities in such area should cease immediately and an ecologist must be contacted to assess the site and required measures.	N	-1	-1	-3	-1	-6	R

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			Direct impact: Loss of ecological connectivity and ecosystem functioning - most importantly around Project 1.	N	-3	-2	-5	-5	-15	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 entering the area and being killed. All areas, especially with the exploration activities, should be rehabilitated once construction has been completed, and in the case with the drilling pads, once the drilling activities at each pad have been concluded. In the establishment of fences, erect fences in such a manner as to limit the potential of animals to enter active mining areas. This could involve the placement of rocks and materials at on the surface of the fences.	N	-1	-1	-2	-3	-7	R
			Loss of faunal habitat, species and faunal SCC which is more so related to the exploration activities, but should be noted for any developments on site).	N	-3	-2	-5	-5	-15	Adhere to management measures presented for the vegetation protection. Removal of faunal SCC host plants *Vitex obovata* subsp *wilmsii* is to be actively avoided, where this is not feasible the clearing of such vegetation must be minimised as far as possible. When rehabilitating a footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonise the rehabilitated area. Rocky outcrop and sheet rock areas should be avoided so as to minimise disturbance to species such as Sekhukhune Flat Lizard (*Platysaurus orientalis orientalis*) and the subspecies Fitzsimons' Flat Lizard (*Platysaurus orientalis fitzsimonsi*) which inhabit these rocky areas. Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities No drill pads are to be located within any freshwater systems or their associated buffer zones identified as part of the EMPr, this will ensure the continued protection of these systems and	N	-1	-1	-2	-3	-7	R

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										the species they support through habitat and resource provision. Drill pads located in open grassed areas near the Klein and Groot Dwars river systems, notably in areas of deeper soil must be searched for any signs of mole activity. Should such be found, a suitably qualified specialist is to be contacted in order to advise on the species likely occurring in the area and the best way forward. During this time, drilling and vegetation clearance is to cease until further instruction by the specialist. Removal/ cutting down of large trees (>4m) should be avoided, notably in the riparian areas, valleys between mountain slopes and along the mountain sides, as these are considered important for large raptors, and cannot be readily replaced through rehabilitation. Drill pads should avoid rocky outcrops and areas of sheet rock, as these are primary habitat for SCC such as *Hadogenes polytrichobothrius* (flat rock scorpion). Prior to vegetation clearing activities in the Sekhukhune Mountain Bushveld and Sekhukhune Bushveld habitat, the sites should be inspected for the presence of baboon spider burrows. If located, these species should be carefully excavated by a specialist ensuring no harm to the spider and relocated to similar surrounding habitat outside of the footprint area. Smaller species such as scorpions, amphibians and reptiles are likely to be less mobile during the colder period, as such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles/ amphibians should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own. No hunting/trapping or collecting of faunal species is allowed No informal fires by construction personnel are allowed.							

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			Direct impact: The disturbance of the cleared areas may allow the establishment and increased prevalence of alien and invasive vegetation. The fact that the areas cleared for construction creates niches that can be colonised by alien 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
			Direct impact: Increased vibration and noise will have a significant effect mainly on fauna species in the immediate vicinity of the development, due to the heavy machinery utilised, and the presence of the activities towards the Springkaanspruit and Dwarsrivier. Direct impact: Vibration can also affect a number of subterranean fauna taxa, such as burrowing mammals, reptiles and arthropods. Vibration affects these animals by causing the collapsing of burrows, and causing these animals to leave the area due to the vibration. Direct impact: Noise will also affect a wide range of taxa including avifauna, mammals, reptiles, amphibians and arthropods.	N	-1	-2	-3	-2	-8	Equipment will be well maintained to reduce excessive noise creation. Activities should remain within the demarcated sites. Activities will be restricted to the day time.	N	-1	-2	-2	-1	-6	CbA
			Direct and Cumulative Impact: Habitat degradation due to	N	-2	-2	-3	-2	-9		N	-1	-1	-2	-1	-5	CbA

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			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 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.							Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Implement dust suppression in and around the construction area where required.							
			Direct Impact: Increased erosion can eventually lead to the further loss of vegetation and habitat for floral and faunal 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, relatively 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. An approved SWMP 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. Vegetation clearance should be limited to what is necessary, specifically in steeper areas and rock outcrops with higher erosion potential. An erosion monitoring and mitigation plan should be put in place around active drainage channels.	N	-1	-1	-2	-2	-6	CbA
	1, 2 (truck parking)	Riparian Habitat & Wetlands	Various non-perennial drainage channels are present in this area. The Richmond Dam is also in close proximity to the drilling activities. This could result in: 1. Potential direct loss of instream, riparian or floodplain habitat.	N	-3	-2	-2	-3	-10	Ensure that the surface infrastructure footprint does not encroach on freshwater resource habitats or the surrounding dams 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.	N	-2	-1	-1	-2	-6	CbA

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			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.							Exploration drilling activities must remain outside of the 1:100 flood line and where this is not possible, the required approval must be obtained from the DWS. Exploration drilling activities should further be restrained to the dry season. Exploration drilling should not be permitted within the active channels, floodplain wetland or riparian zones of the systems or within 32m thereof. Access roads for the exploration drilling sites should be limited by utilising existing roads as far as practically possible. Where new roads are constructed the necessary approvals in terms of the NEMA, and Section 21c&i, should be obtained through the LEDET and DWS respectively. Where access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr. Ongoing biomonitoring should be undertaken at the upstream and downstream points along perennial water systems. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. An SWMP 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. The proposed SWMP included into the EMPr for the drilling pads should be implemented. Implement and maintain alien and invasive vegetation eradication and management programme. Minimise the period in which excavated trenches, foundations etc. remain open, in order to reduce the risk of draining up gradient freshwater systems.							

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										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 form as a result of the formation of preferential flow paths. Access roads and vehicle movement should follow the natural contours of the landscape as much as possible. Ensure that management measures developed by a suitably qualified hydrologist within an approved SWMP and the requirements developed for the drilling pads as per the EMPr are implemented to mitigate against concentration of runoff if deemed necessary.							
	1, 2 (truck parking)	Hydrology	Direct impact: 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 bare 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 SWMP 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 (Truck Parking, Laydown area), 3 (North Mine Undergrou nd Supply)	Heritage	Large portions of the study area are characterised by existing mining operations that would have impacted on surface indicators of heritage sites and apart from isolated widely scattered MSA artefacts (of low significance) no archaeological sites of significance were recorded during the survey for the Capital projects and Diesel Storage. In terms of the	N	-3	-3	-3	-4	-13	The two heritage sites identified in the area of the exploration project, should be avoided with a 50m buffer zone around the sites. In the event that any other heritage artefacts or graves are encountered during the excavation activities, all activities must cease and the SAHRA should be contacted to determine the way forward before construction may continue. A 100m buffer should be kept around the Dwarsrivier National Monument. The structures identified in the heritage study around the exploration project should be avoided with a 30m buffer zone.	N	-1	-1	-2	3	-1	CbA

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			exploration programme two Iron Age sites were recorded by Stegman & Roodt (2012).							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 EMPr. A short summary of chance find procedures is discussed below. This procedure applies to the developer'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 developer, 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 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 find and will notify the SAHRA.							
		Visual	Direct impact: soil stripping and footprint clearance.	N	-1	-2	-1	0	-4	Stripping of vegetation and soils should be undertaken within the demarcated areas only.	N	-1	-1	-1	0	-3	R
	All	Air Quality	Direct impact: 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, especially with the exploration activities, should be rehabilitated once construction has been compiled, and in the	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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. It must be ensured that topsoil stockpiles are suitable vegetated. Limit site clearance to designated areas.							
	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 (Topsoil Stockpile, Low Grade Stockpile)	Topography	During the site clearance activity, the required storm water management systems and shaping of land would have been completed. Therefore, no further impact on the topography is expected.	-	-1	-3	-3	-2	-9	Activities should be constructed and developed according to the approved design concepts. Note that laydown areas will only be placed in areas which are demarcated for permanent activity or existing disturbed areas to ensure that no additional areas are disturbed.	N	-1	-1	-2	-1	-5	R
	All	Soil, Land Use and Land Capability	Direct impact: 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. Existing access roads must be used as far as possible. Where additional access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										The access roads and drilling sites should be inspected regularly for erosion. Ensure the required erosion protection measures are monitored and corrected where necessary. Erosion rills and gullies should be repaired immediately. Causes of erosion should be determined and mitigated, to prevent future erosion of repaired areas. Vegetation established, will be monitored and assessed to ensure that these remain well established. Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas. Vegetation clearance and commencement of construction and exploration activities, particularly along the Dwarsrivier system, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low and the soils are less prone to compaction. 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 exiting the site (i.e. grid system or permanently manned personnel to treat soils during periods of refuelling). Where erosion gulley are formed, these will be recorded on the IsoMetrix system for immediate action.							
	-	Terrestrial Ecology (Fauna & Flora)	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2 (Truck Parking and	Riparian Habitat & Wetlands	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 according to the approved design concepts. Direct surface disturbance of the identified high clay content/wetland (i.e. Acardia, Rensburg, Alluvial etc.) soils	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	associated roads)									should be limited within demarcated areas where possible, to minimise the intensity of compaction due to the susceptibility of these soils to prolonged waterlogging conditions (inundation). No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr. 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 avoided as far as possible. Re-fuelling of vehicles may only be undertaken in demarcated workshop areas. Activities should not obstruct flow. Where possible, existing access roads should be used for monitoring purposes so as to minimise the compaction of soils and loss of both riparian and instream habitat. 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. During monitoring, always use the shortest routes possible so as to minimise disturbance and loss of habitat both instream as well as in the riparian zone. The riparian zone must be monitored for alien and invasive vegetation encroachment and all alien and invasive vegetation must be removed according to an alien vegetation control/ eradication and management plan. Any erosion or gully formation must be identified on an ongoing basis, re-profiled and revegetated accordingly.							
	1, 2 (Truck Parking and	Hydrology	The low level crossing at the Exploration activities could impact on the hydrology of the runoff system in storm events.	N	-3	-3	-3	-3	-12	For the access roads, it is proposed that berms are constructed across the width of the road, at a 30° to 40° angle. Material for the berms can be sourced from the road cuts, depending on the soil type. The berms should extend well beyond the width	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	associated roads)		The Exploration Activities could have a further impact on the Richmond Dam if not well managed. The Truck Parking is in close proximity to a storm water channel which leads to the Groot Dwarsrivier.							of the road, particularly on the downslope side, and it should be ensured that runoff is discharged into a well vegetated or stony area, to prevent erosion. The berms should be constructed to be gradual, in order to allow vehicles to easily pass over them, but should not be overtopped by runoff. Berms should be prioritised at the top of steep transitions in the road slope, as well as above drainage line crossings. The conceptual SWMP provided for the project and discussed in the Report should be implemented (refer to Section 1.g.v.5.c). No drilling activities may take place within and agreed buffer (DWS to stipulate) between the Richmond Dam and the drilling activities. No drilling may take place in the 1:100 year flood line unless approved by the DWS. Activities should not obstruct flow. Vehicles and activities will be well maintained and operated.							
	2, 3	Geohydrology	Direct impact. The use of discard rock in the compaction of the roads and surface footprints should not lead to an impact on the groundwater resources as the material is not considered a pollutant. According to Ivusi [Ivusi 2009] the outcome of acid-base accounting (ABA) leach tests results undertaken on tailings and waste rock samples at Dwarsrivier in 2006 was that the material is relatively inert.	-	-2	-3	-1	-3	-9	The use of discard rock will only be undertaken when an alternative such as paving proved to be economically unviable. Exemption in terms of GN704 (Regulation 5) should be obtained from the DWS for the use of the discard in the construction of the proposed activities. Groundwater monitoring should be undertaken to ensure that the facilities are operated in manner as not contributed to the current and historic pollution plumes.	N	-1	-2	-1	-1	-5	CbA
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	Visual	Direct impact: Establishment of infrastructure, especially the exploration roads along the mountainous area.	N	-2	-2	-4	-3	-11	Activities should be restricted to within the approved footprints. The roads should follow natural contours as far as practically possible.	N	-2	-1	-2	-2	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										Drilling activities should be restricted as far as practically possible to the lower lying areas and not on steaper slopes or rocky outcrops. Roads should only be constructed where absolutely necessary with the least amount of vegetation clearance possible. Once exploration has been completed in an area, the roads should be rehabilitated.							
	-	Air Quality	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Noise	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	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	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 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 contaminated material at the drill pads as part of the exploration activities must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur. 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 Safety Data Sheets (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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/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	CbA
	1, 2, 3	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, and 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. The Richmond Dam is also in close proximity to the drilling activities.	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 it must be ensured that all waste is removed to an appropriate disposal facility. Ongoing biomonitoring should be undertaken at the upstream and downstream monitoring 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

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
	1, 2 (truck parking)	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 incorporated in terms of the 2016 SWMP or any approved update thereafter, including the recommendations as per this EMPr. 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. All contaminated material at the drilling sites associated with the exploration activities must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed 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.	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	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, including the recommendations as per this EMPr. Waste management training must be implemented on site.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			disposal of waste could hamper the integrity of the storm water system.							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 licenced facilities. Recycling practices must be investigated and implemented on site.							
	1, 2, 3	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 or any approved update thereafter, including the recommendations as per this EMPr. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. 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 (LDEDET, Catchment Management Agency (CMA)/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.	N	-2	-1	-2	-1	-6	CbA
			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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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 licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.							
			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 sites to ensure that best practices are implemented. Recycling practices must be investigated and implemented on site where practical. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the site activities can be detected.	N	-1	-1	-1	-2	-5	CbA
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 53: Potential Impacts and the calculated significance before and after management measures – 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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Operational Phase																	
Exploration Drilling Activities	1	Geology	Impact on Mining operations of applicant as well as Two Rivers Platinum Mine.	N	-3	-2	-4	-4	-13	Early consultation to determine the requirements of both parties. An open channel of consultation must be maintained throughout the process. Where conflict arise the DMR must be involved to facilitate consultation processes.	-	-1	-1	-1	-1	-4	CbA
		Topography	No impact foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Contamination of soils due to the presence of contaminants.	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 contaminated material at the drilling sites/ exploration activities must be contained in mobile sumps. These must be of an adequate size to contain runoff from the drilling sites. The water levels within the sump must be inspected regularly, and dirty water removed to allow adequate freeboard at all times. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur. The mobile sump should be placed at the lowest but closest point to the drilling site, to ensure that all dirty water from the site drains towards the sump.	N	-1	-2	-2	-2	-7	CbA
			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	CbA
		Vegetation		N	-2	-3	-3	-3	-11	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,	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			A number of impacts have been identified as part of the ecological specialist study: • Site clearing and the removal of vegetation leading to a loss of sensitive floral habitat; • Excavation of soils leading to increased runoff and sedimentation of downslope habitat; • Dust generation during construction leading to a loss of floral habitat; • Runoff/ disposal of concrete and construction materials from the layout areas into the surrounding habitat leading to surface hardening and limiting recruitment of new vegetation; • Loss of floral diversity through invasion of alien species in disturbed areas; • Movement of construction vehicles and access road construction through sensitive floral habitat; • Compaction of soils reducing efficiency of floral re-establishment; and • Increased fire frequency during construction leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted for the Capital Projects:							presence of protected species, presence of the CBA and ESAs and the importance thereof. When accessing the drill pads, vehicles are to utilise the existing roads. Continually monitor the operational activities of the drill pads ensure that further disturbance of the surrounding habitat is not occurring. Ensure that no unnecessary clearing of floral habitat occurs. Following heavy rains, drill pads and access roads are to be inspected for signs of erosion, which if found, must be immediately rectified through appropriate erosion control measures. No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary system will be developed for any person not complying							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			• Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (low if unmanaged, very low if mitigated). The following significances should be noted for the Drilling Projects: • Sekhukhune Mountain Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated);													

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			• Freshwater habitat (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium Low if unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species diversity): Very Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).														
		Wetlands and Riparian Habitat	Operation of drilling activities within flood line areas. The following impacts were identified: 1. Possible contamination of surface water, leading to impaired water quality and contamination of soils within freshwater resource areas. 2. Sedimentation of freshwater resources could lead to altered water quality, altered channel competency and altered vegetation community composition.	N	-3	-3	-3	-3	-12	Drilling must not take place within the active channels, delineated floodlines or steep riparian zones associated with the freshwater resources or within 32m thereof. Drilling activities will not take place within the 1:100 year flood line. A spill prevention and emergency spill response plan should be compiled to guide the construction works; and an emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur.	N	-2	-1	-1	-2	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			3 Potential for further erosion and sedimentation of freshwater resources, leading to altered channel competency and altered vegetation community composition. 4. Altered runoff peaks leading to changes in the hydrological regime on a localised scale.														
		Hydrology	The Exploration activities could impact on the hydrology of the runoff system in storm events. The Exploration Activities could have a further impact on the Richmond Dam is not well managed.	N	-3	-3	-3	-3	-12	No drilling activities may take place within 100m of the Richmond Dam. No water may be abstracted from watercourses, without the necessary approval by the DWS. Measures to contain and reuse as much water as possible within the mine process water system should be undertaken. Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised. The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment. Vehicles and activities will be well maintained and operated.	N	-2	-1	-1	-2	-6	R
		Geohydrology	Unlawful abstraction of groundwater and the contamination of groundwater.	N	-3	-3	-3	-3	-12	Exploration drilling must be undertaken by a reputable company and each exploration borehole site must be adequately supervised by a Dwarsrivier Mine representative. All personnel involved in the exploration programme must receive adequate training regarding the groundwater management programme, spill procedures, use of oil spill kits and rehabilitation of exploration boreholes before work commences. The area to be disturbed must be kept to a minimum, not exceeding 20m x 20m. Exploration drilling must not take place on the alluvial aquifer, as it is vulnerable to surface sources of contamination. A drip tray or similar containment measure must be placed underneath the drilling rig to contain oil and diesel spills.	N	-1	-1	-1	-2	-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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										Only biodegradable drilling fluid must be used during exploration drilling. A chemical toilet must be used on site during exploration drilling. Full or leaking toilets must be reported to the Supervisor for corrective action or replacement. Sediment and erosion controls must be designed to contain possible dirty runoff within the drilling pad. This will be achieved with the portable bunding that will be installed around each drilling pad. Spills must be managed according to a formalised Spill Procedure. Any contaminated soil must be collected into non-permeable bags and disposed of to an approved disposal facility. For the purpose of future monitoring programmes, impact assessments and rehabilitation, the depth of water strikes must be recorded during exploration drilling. The static groundwater level must be monitored in each exploration borehole after completion and before rehabilitation for future monitoring, impact assessment and rehabilitation purposes. No water may be abstracted from groundwater resources without the necessary approval by the DWS. Measures to contain and reuse as much water as possible within the mine process water system should be undertaken. Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised. The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment. No maintenance may be undertaken outside of approved workshop areas.							
		Air Quality	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	Direct impact: Establishment of infrastructure, especially the exploration roads along the mountainous area.	N	-2	-2	-4	-3	-11	Activities should be restricted within the approved footprints. The roads should follow natural contours as far as practically possible and should be constructed with the aim of rehabilitation practices in mind. Roads should only be constructed where absolutely necessary with the least amount of vegetation clearance possible. Once exploration has been completed in an area, the roads should be rehabilitated.	N	-2	-1	-2	-2	-7	R
		Landowner Relationships	Unlawful access to land or mining activities	N	-3	-2	-4	-4	-13	Early consultation to determine the requirements of both parties. An open channel of consultation must be maintained throughout the process. Where conflict arises, the DMR must be involved to facilitate consultation processes.	-	-1	-1	-1	-1	-4	CbA
		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
Operation of the Product Stockpile	2	Geology	No direct impact. Impacts are addressed during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	The ongoing development of the Plant Stockpile will result in an ongoing change in the topography.	N	-2	-2	-1	-2	-7	The slopes of the Product Stockpile should be developed and managed in such a manner that the facility remains within the contained footprint and at a stable slope. The Product Stockpile should be located within the existing demarcated footprint area.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Soils	The unmanaged disposal of material and the overflow of product from the demarcated areas could result in an impact beyond the designated footprints.	N	-3	-3	-3	-4	-13	Stockpiling of product should take place within the demarcated areas.	N	-1	-1	-2	-1	-5	CbA
			Contamination of Soils.	N	-1	-2	-4	-4	-11	Ongoing maintenance around transfer points should be undertaken. Any spills of product around the conveyor systems should be collected and taken to designated stockpile areas.	N	-1	-1	-2	-1	-5	CbA
		Ecology	The unmanaged disposal of and the overflow of product from the demarcated areas could result in an impact beyond the designated footprints.	N	-3	-3	-3	-4	-13	Stockpiling of waste and product should take place within the demarcated areas.	N	-1	-1	-2	-1	-5	CbA
			Presence of alien and invasive species could impact on the natural succession of vegetation around project infrastructure.	N	-2	-3	-3	-3	-11	A search must be undertaken prior to clearance for indigenous plants that can be carefully removed and stored for rehabilitation. 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. Compile list of protected and threatened/ Red Data Listed species and compile a relocation programme. The plan for vegetation clearance, must be developed and implemented prior to site clearance.	N	-1	-1	-2	-1	-5	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										Seeds of indigenous plants must also be collected during the clearance activities where practical.							
										All employees, or contractors on site, involved in this project, must undergo an induction prior to construction where they will be made aware of the footprint, prohibited areas and the importance of compliance with management measures, as well as potential penalties for noncompliance.							
										No open fires must be allowed.							
										Vegetation clearance must be limited to within the footprint area.							
										An alien and invasive plant species control/eradication and management programme must be implemented on site and enforced. This programme must stipulate the monitoring plan, which should include: capturing of areas where alien and invasive species are present and action plan to remove these and % successful removal).							
		Riparian Habitat and Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Groundwater	Stockpiling of material onto the surfaced (cemented) product stockpile.	N	-2	-3	-1	-2	-8	The groundwater monitoring programme must be implemented and undertaken in accordance to the approved WUL of the mine (current and or future).	N	-1	-2	-2	-2	-7	CbA
										The product should be stockpiled within a contained facility, no material to be stored on unsurfaced areas.							
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	Wind erosion from Stockpiles may produce fugitive dust.	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.	N	-1	-1	-2	-2	-6	CbA
										Ensure that the necessary dust suppression is implemented at transfer points on the conveyor if found necessary during dust monitoring studies.							
										Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)].							
		Visual	Fugitive dust emissions during stockpiling may have a negative impact on the visual characteristics of the area.	N	-2	-1	-1	-1	-5	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Ensure that the necessary dust suppression is implemented at transfer points on the conveyor if found necessary during dust monitoring studies. Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)]. The Product Stockpile should form part of the overall layout of the existing plant to minimise the additional visual impact.	N	-2	-1	-1	-1	-5	CbA
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Social	The demand for chrome has increased globally due to the increase in China Markets. Not allowing the expansion of Plant Product Stockpile and optimising the logistics around the mining operation may result in a restriction on the volume of this material to be produced. This will result in restricting the mine to market supply available reserves and could impact on the economics of scale of the mining operation. The formalisation of the infrastructure on site is undertaken for the optimal operation of activities on site.	N	-4	-3	-5	-4	-16	The approval of the project will allow the mine to continue with logistically sound operations in a long term.	P	3	3	5	4	15	CbA
Truck Parking, Roads and Transportation	1, 2	Geology	No direct impact. Impacts are addressed during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		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.	N	-1	-1	-2	-1	-5	R

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										No refuelling of trucks may be undertaken in the truck parking area, but only in designated refuelling's areas on site. If necessary, the polluted soils will be remediated and affected areas rehabilitated. All transportation companies will be informed of the requirements in terms of well-maintained trucks and any fines associated with non-compliance. Should trucks arrive on site, not on standard in terms of maintenance these may not be allowed access to site. 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. Operators at the truck parking area, must be trained in the: • Use of spill kits; • Emergency preparedness programme; • Incident reporting procedures; • Hydrocarbon management.							
		Vegetation	The specialist studies identified the following impacts: • Potential ineffective rehabilitation post construction leading to proliferation of alien and invasive plant species in the disturbed areas. • Potential erosion stemming from bare soil areas leading to sedimentation of downslope floral habitat. • Risk of discharge and contamination from proposed mining activities may pollute the receiving environment leading to altered floral habitat.	N	-2	-3	-3	-3	-11	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 importance thereof. No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary system will be developed for any person not complying	N	-1	-1	-1	-2	-5	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			• Development beyond the demarcated areas resulting in additional floral habitat loss. • Additional pressure on floral habitat by increased human populations associated with the proposed mine leading to a loss of floral habitat. • Dust generation during operational activities leading to a loss of floral habitat. • Increased fire frequency during operation leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted: • Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated).														
		Ecology	The establishment of alien and invader plant species.	N	-2	-3	-4	-4	-13	An alien and invasive species control/ eradication and management programme will be developed and implemented to eradicate alien and invasive plants and to prevent new invasions during the ongoing mining operation.	N	-1	-1	-2	-1	-5	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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.							
			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 and Wetlands	Various non perennial drainage channels are present in this area. The Truck Parking access road in particular will be located in close proximity to this drainage channel.	N	-4	-2	-3	-3	-12	The truck parking itself should remain at all times outside of the 1:100 year flood line of the watercourses unless approved in terms of the necessary legislation. Ongoing biomonitoring/ surface water monitoring should be undertaken at the upstream and downstream points along perennial water systems/ identified monitoring points. Trucks should be well maintained, and any truck not in proper condition which could impact on the watercourses or hydrological system of the site should be subjected to a warning system and fines. Approved SWMPs 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	Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted.	N	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be maintained. Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)	N	-1	-1	-2	-1	-5	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										Vehicles/ machinery will be regularly monitored and maintained. Maintenance programmes in this regard will be established and implemented.							
										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.							
										Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.							
										Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this event a remediation strategy should be developed and enforced.							
										A clean up procedure (i.e. Works Instruction) must be in place.							
		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.	N	-1	-1	-2	-1	-5	CbA
										Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)].							
										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.							
		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	N	-1	-4	-1	-1	-7	Machinery and vehicles will be well maintained to prevent excessive noise and to comply with national and provincial regulations.	N	-1	-1	-1	-1	-4	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			foreseen that the roads proposed would contribute to any additional noise levels in the area.							All vehicles will have muffles to minimise noise emissions, where necessary. All transportation companies will be informed of the requirements in terms of well-maintained trucks and any fines associated with non-compliance. Should trucks arrive on site, not on standard in terms of maintenance these may not be allowed access to site.							
		Visual	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	The safe parking of trucks within the mining area will have a positive impact on the area.	N	-3	-3	-4	-4	-14	No trucks may be parked on either the Two Rivers Platinum Mine access road or the Sekhukhune Regional road. Operate the Truck Parking facility in terms of the approval from the relevant Roads Agency regarding the design and operation of the road. Approved agreement between Two Rivers Platinum and Dwarsrivier Mines regarding the logistics of road usage.	P	3	3	4	4	14	CbA
Storage of Water in Reservoir	2	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Overflow of Dams could result in the increase of erosion around these facilities.	N	-1	-2	-4	-2	-9	Water levels should be monitored and should be maintained at a 0.8m freeboard. Maintenance of all storm water anagement systems must be undertaken regularly on site. Water structures should be monitored to ensure the integrity of these facilities.	N	-1	-1	-1	-2	-5	CbA
		Ecology	Ongoing overflows of the Treated Water Reservoir, could lead to permanent erosion, which will	N	-1	-2	-4	-2	-9	Water levels should be monitored and should be maintained at a 0.8m freeboard. The Treated Water Reservoir should be covered to limit access to animals or avifauna.	N	-1	-1	-1	-2	-5	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			impact on the ecological establishment in this area.							Maintenance of all storm water management systems must be undertaken regularly on site. Water structures should be monitored to ensure the integrity of these facilities.							
		Riparian and Wetlands	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Surface Water	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Groundwater	No impact, but a cumulative possible outcome.	-	-	-	-	-	-	The mine should optimise the internal water circuit to allow for the reduction of groundwater supply where possible.	P	3	4	3	3	13	CbA
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Social	The establishment of the reservoir could in future allow for the reduction of the need for groundwater supply to the mine.	N	-3	-4	-2	-2	-11	The mine should optimise the internal water circuit to allow for the reduction of groundwater supply where possible.	P	3	4	3	3	13	CbA
Offices, Laydown Areas and Security Upgrades	2	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	
		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 alien and invasive plant 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.	N	-1	-1	-2	-1	-2	R

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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 revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.							
			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 indicated 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	-3	-1	CbA
		Riparian and Wetland Habitats	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	Contamination of surface water resources. There are no surface water resources in the area where the infrastructure is proposed, however, the natural runoff, which must be managed internally on site could become impacted.	N	-1	-2	-3	-3	-9	Clean and dirty water separation systems should be maintained. Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms). Conveyors associated with the Plant Product Stockpile will be maintained and constructed with the appropriate culverts and drains, levelling and surfacing to ensure adequate drainage. Vehicles and machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented. 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. Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal. Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this	N	-1	-1	-2	-1	-2	CbA

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Activities			Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										event a remediation strategy should be developed and enforced.							
										A clean up procedure (i.e. Works Instruction) must be in place.							
		Groundwater	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		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.	N	-1	-1	-2	-2	-2	CbA
										Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)].							
										Roads and walkways around office areas will be paved as far as practically possible.							
										During the operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet suppression to reduce dust creation.							
										Tarpaulins will be placed over all vehicles transporting product.							
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		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.	N	-1	-1	-1	-1	-4	CbA
										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.							
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diesel Storage and Underground Supply	3	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils		N	-1	-2	-4	-4	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated,	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			Contamination of soil resources due to hydrocarbon spills.							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 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 (LDEDET, CMA/DWS).							
										Pipelines 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.							
										Safety signage must be used at designated storage areas as well as transportation pipelines.							
										At least weekly inspections should be undertaken around the diesel bunded 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		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	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			Spills of hydrocarbons could damage the ecological character along pipeline routes.							(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 bunded areas and supply pipelines.							
		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 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 any spills within 24 hours. Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed 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.	N	-1	-1	-2	-2	-6	CbA
			Handling and Storing of Domestic Waste in the area should have no impact on the surface water resources due to the location of the	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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			facility. However, incorrect disposal of waste could hamper the integrity of the storm water system.							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 around upstream of the facility must be maintained.							
										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	Pipelines must 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.	N	-1	-1	-2	-1	-5	CbA
										At least weekly inspections should be undertaken around the diesel bunded 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 (LDEDET, CMA/DWS).							
										All equipment and machinery should be kept in good working order.							
										A clean up procedure (i.e. Works Instruction) must be in place.							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			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. 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 licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6	CbA
		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	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). 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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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. 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. The Truck Parking will also be located in close proximity to a drainage channel.	N	-3	-2	-2	-3	-10	Remain at all times outside of the 1:100 year flood line of the watercourses and those buffers as stipulated in the EMPr. Ongoing biomonitoring should be undertaken at the upstream and downstream monitoring points. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. An approved SWMPs 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

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Surface Water	Handling of Hazardous Waste within diesel storage areas, laydown areas 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 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. 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 (LDEDET, CMA/DWS). Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed 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.	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	-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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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.							
										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 (LDEDET, CMA/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.							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/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 of hazardous waste 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.							
										Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.							
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 54: Potential Impacts and the calculated significance before and after management measures – 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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
Decommissioning and Closure Phase																	
Legal Requirements (Environmental Permits)	1, 2, 3	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 EMPr's Quarterly monitoring of decommissioning activities must be undertaken, on the lawful implementation of the Environmental Authorisation. Environmental Authorisations and all related permits 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 Exploration Drilling Sites		Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	Returning the area to be stable and free draining.	N	-2	-3	-5	-4	-14	All drilling pads should be rehabilitated upon completion of that specific drilling portions to conform to the end land use requirements. The landscape should be backfilled and reprofiled to mimic the natural topography for potential agricultural activities and grazing opportunities post-mining. If possible ensure a continuation of the pre-mining surface drainage pattern. All exploration roads should be rehabilitated once the exploration in that area has been completed and the roads are no longer required. The roads and drill pads should be graded and sloped to blend into the surrounding environment. Where any slopes with steep gradients are present 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

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Soils	Decommissioning activities could lead to additional erosion in the area.	N	-1	-3	-5	-4	-13	All drilling pads should be rehabilitated upon completion of that specific drilling portions to conform to the end of land use requirements. All exploration roads should be rehabilitated once the exploration in that area has been completed and the roads are no longer required. Compacted soils adjacent to the activities and associated infrastructure footprint can be lightly ripped to at least 25cm below ground surface to alleviate compaction prior to re-vegetation. Where 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
		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 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 further loss of floral SCC; • Permanently altered habitat may result in the alteration of floral species abundance and	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/ threatened species, presence of the CBA and ESAs and the importance thereof. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary 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-planted. The seed mixture should be incorporated into mulch which includes fertiliser and germination acceleration agents where required. Regular application of fertiliser, if required, should take place 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	P	3	3	3	5	14	CbA

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			diversity of which a number are endemic to the region. The following significances should be noted for the Drilling Projects: • Sekhukhune Mountain Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species							Compacted soils within and adjacent to project footprint areas can be lightly ripped to at least 25cm below ground surface to alleviate compaction prior to re-vegetation. Soils recovered during construction should be re-used to rehabilitate the project footprint areas following 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. 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. Ongoing monitoring of vegetation establishment should be undertaken by a qualified ecologist. 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 also introduced and given opportunity to 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 within the rehabilitation areas.							

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			diversity): Very Low if unmanaged, and Very Low if mitigated); Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).														
		Riparian and Aquatic System	Loss or Impact on Riparian and Aquatic System	N	-4	-3	-1	-5	-13	No activities are planned within the buffers as stipulated in the EMPr. This restriction should be maintained. Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, a clean water diversion system may remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible. 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. All affected areas should be resloped and dressed with topsoil where necessary and reseeded with indigenous grasses. It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected. Ongoing aquatic biomonitoring should take place throughout the closure phase of the mine and should continue into the post closure phase to define latent impacts that need to be mitigated.	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 100m between the Richmond Dam and the drilling activities. Where 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 No activities may take place in the 1:100 year flood line unless approved by the DWS.	N	-2	-1	-1	-2	-6	CbA

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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.							
		Groundwater	Contamination of groundwater resources.	N	-3	-3	-3	-3	-12	All boreholes must be sealed upon completion to prevent ingress of water from surface. Any completed borehole that is not required for groundwater monitoring, must be sealed and rehabilitated to prevent groundwater contamination. Rehabilitation of exploration boreholes as well as the site and access tracks must be undertaken upon completion of drilling at each position.	N	-2	-1	-1	-1	-5	CbA
		Heritage	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Landowner Relationships	Unlawful access to land or mining activities	N	-3	-2	-4	-4	-13	Early consultation to determine the requirements of both parties in terms of decommissioning and rehabilitation. An open channel of consultation must be maintained throughout the process. Where conflict arises, the DMR must be involved to facilitate consultation processes.	-	-1	-1	-1	-1	-4	-
		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 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	-	-2	-1	-1	5	1	-
Dismantling and decommissioning of infrastructure and buildings, including product	2, 3	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 (IDP) of the area and the local authorities.	P	3	3	4	4	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
stockpiles										Ensure the entire site remains fenced for the duration of rehabilitation. Retain security access control to the site for the duration of rehabilitation. All product stockpile to be removed from site. 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 DMR. All surface infrastructure would be demolished and removed to a depth of 1m. Any infrastructure below 1m 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 storage areas and product stockpiles 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 not to compact new areas. Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately.	-	-1	-2	-1	-1	-5	-
			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	-

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			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 within and adjacent to the project footprint areas can be lightly ripped to at least 25cm 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 are 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 alien and invasive plant species.	N	-2	-3	-4	-4	-13	An alien and invasive plant species control/eradication and management programme will be developed and implemented to eradicate alien and invasive plant species and to prevent new invasions during closure and decommissioning if infrastructure. Where self-succession does not establish, harvested seeds and plants must be used in concurrent rehabilitation for any areas which may be affected.	N	-1	-1	-2	-1	-5	CbA
			Unplanned loss of floral and faunal species of conservation importance. The significance rating has been combined in this table. The specialist study indicated the following ratings: - Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated);	N	-2	-4	-4	-4	-14	All activities should be restricted to the demarcated and approved footprints. Ongoing vegetation establishment should be undertaken throughout the decommissioning and closure phase and this should be monitored by a qualified ecologist. 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.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			• Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated).							No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary 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.							
			Accidental death of animals on the roads.	N	-2	-3	-2	-5	-13	Clearly marked signs must be maintained 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	Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, any clean water diversion system should remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible. Upon closure all haul and access roads which are no longer required, as well as all unnecessary mining infrastructure (including temporary structures) should be removed to minimise the impacts on the aquatic resources of the area beyond the life of mine. Compacted soils should be ripped and revegetated with indigenous vegetation to prevent erosion, sheet runoff, and discourage the establishment of alien floral species post-closure. Remain at all times outside of the 1:100 year flood line of the watercourses where not authorised.	N	-1	-1	-1	-2	-5	CbA

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										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 SWMPs should be retained in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter watercourses.							
		Wetland	Loss or Impact on FEPA Sites	N	-2	-2	-1	-5	-13	No activities are planned within 500m from any FEPA sites unless authorised. This restriction should be maintained.	N	-1	-1	-1	-1	-4	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 impact in terms of air quality and visual characteristics.	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 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 ECO and an air quality specialist as part of the contractor's responsibility.	N	-2	-1	-3	1	-5	CbA
		Air Quality	All activities associated with the removal of infrastructure and	N	-2	-2	-4	1	-7	The dust monitoring network and dust suppression programme established during the construction phase of the	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			rehabilitation has the potential to release dust.							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.							
		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		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 and where possible, pre-mining conditions. 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 soil analyses as	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
										recommended by a soil 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. On-going alien and invasive floral species control is required through all phases of rehabilitation. The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation). Soil amelioration should be done according soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation. Access to rehabilitated areas should be restricted to vehicles/ machinery specifically required for the implementation of the closure plan.	P	3	3	3	4	13	CbA
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are 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. 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.	P	3	3	3	4	13	CbA
		Geohydrology	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		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 graded and re-vegetated.	P	2	4	4	3	13	CbA
										Demarcate the decommissioning area and limit the decommissioning activities as far as possible.							
										Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.							
										Foundations will be removed to a depth of 1m 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 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.							
				N	-2	-2	-4	1	-7	Dust sampling will be undertaken on a monthly basis.	N	-2	-1	-3	1	-5	CbA

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		Air Quality	All activities associated with the removal of infrastructure has the potential to release dust.							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.							
		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 I Safety Regulations. Speed control measures will be implemented by the mine through the maintenance 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. Any gravel roads that are to remain, are 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**	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil, Land Use and Land Capability	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		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 DMR.	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 (SLP) 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		Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil, Land Use and Land Capability	Spills around the diesel storage 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		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 maintained on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.	N	-1	-1	-2	-2	-6	CbA
			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 1m below surface. All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible or 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 maintained 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	N	-3	-2	-2	-4	-11	Clean and dirty water separation systems should be maintained up until closure.	N	-1	-1	-2	-2	-6	CbA

Name of Activity			Potential Impacts	Rating Prior to Measures						Mitigation Type	Rating Post Measures					Significance	
Activities	Project	Impact Area	Potential Impacts	Status	Extent	Duration	Probability	Intensity	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
			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.							Waste management training must be implemented on site. Clear signs informing staff of waste management practices must be maintained 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 licensed removal company and taken to a suitable and licensed 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.							
			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 management 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 maintenance requirements must be documented, and an action plan developed. Clear signs informing staff of waste management practices must be maintained on site. Recycling practices must be investigated and implemented on site. Building rubble must be disposed of in line with the requirements of the NEM:WA. Access control must be strictly enforced.	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	SbM	Mitigation Measures	Status	Extent	Duration	Probability	Intensity	SaM	CbA/R/Ir
		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.j Summary of Specialist Reports

For the purposes of the environmental authorisation related to this application, numerous detailed specialist studies were undertaken. Please refer to Appendix 6 for these reports. The table below presents a concise snapshot of what the outcomes of these studies.

Table 55: Summary of findings from specialist studies undertaken

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
Soils, Land Use and Capability, 2018 (Annexure 6)	The findings of this assessment suggest that the relevant soil limiting factors within the area for land capability and land use potential include the following: • Shallow effective rooting depth due to shallow indurated bedrock of the Mispah, Glenrosa, Mayo soil forms. As such, these soils are not considered to contribute significantly to agricultural productivity; • Susceptibility to erosion of Brandvlei/Etosha/Gamoep soils forms associated with the southern portion of the area; • Limited rooting depth due to periodic waterlogging of the Rensburg, Acacia and Alluvial soil forms within the associated with the watercourses. Preservation of these soils for conservation purposes takes precedence, according to the NWA; and • Lack of soil medium for plants and crop growth for the rocky outcrop, mine infrastructure, surface water areas and Witbank (anthrosols) soil types. From a land capability point of view, the Mining Right Area presents relatively small areas of arable soils with a moderate potential for agriculture, comprising just 1.55 % of the total area, whilst the rest of the area is comprised on very shallow soils not considered suitable for agricultural production. The extent of Hutton and Bonheim soils thereof cannot be considered sufficient for viable cultivated small commercial farming. The Hutton soil form will not be impacted by the activities. Only four (4) drill pads are planned at present in the bonheim soils form. Where possible, the mine should retain activities outside of these areas or within areas already approved for future development. Livestock commercial farming is not considered ideal for this area due to the veld being classified as having a grazing capacity of 6 ha Per Large Animal Unit (PLAU). Furthermore, a significant portion of the area is located on a moderately steep terrain (medium gradient, further disqualifying this area for livestock commercial farming. Potential arable soils (Bonheim) will be slightly impacted by the proposed drilling and exploration activities to the north of the Mining Right Area since the current drilling layout intrudes on these soils. From a soil and land capability point of view, this project is not regarded as being fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be strongly considered and implemented accordingly in efforts to conserve soil resources. It is the opinion of the specialist therefore that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area will be made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.	Yes (all)	Refer to Section 1.g.iv.1.d 1.g.v.4, 1.g.v.51.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. Detailed report is attached as Annexure 6. Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.d.
Hydrogeology	A preliminary groundwater impact assessment is presented here. This impact assessment will be expanded and addressed in more detail in the groundwater specialist study that is currently under way. Intersection of groundwater during exploration drilling The impact of exploration drilling on groundwater quality and availability is not considered significant due to the limited extent and short duration of activities at each drill pad.	Yes	Refer to Section1.g.iv.1.h, 1.g.v.4, 1.g.v.51.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	Use of discard rock in construction A preliminary assessment is that the use of waste rock for fill during road and truck parking construction will most probably result in an insignificant impact on groundwater water quality during the operational phase of mining and post-closure. Under-mining of the rivers A preliminary assessment is presented that the undermining of rivers and streams will most probably not result in a significant impact over the life of the operations. Post closure, groundwater levels will recover and residual impacts will reduce with time, most probably within 30 – 80 years of the completion of mining. Management measures recommended include: Exploration drilling • Exploration drilling must be undertaken by a reputable company and each exploration borehole site must be adequately supervised by a Dwarsrivier Mine representative. • All personnel involved in the exploration programme must receive adequate training regarding the groundwater management programme, Spill Procedure, use of oil spill kits and rehabilitation of exploration boreholes before work commences. • The area to be disturbed must be kept to a minimum, not exceeding 20m x 20 m. • Exploration drilling must not take place on the alluvial aquifer, as it is vulnerable to surface sources of contamination. • A drip tray or similar containment measure must be placed underneath the drilling rig to contain oil and diesel spills. • Only biodegradable drilling fluid must be used during exploration drilling. • A chemical toilet must be used on site during exploration drilling. • Full or leaking toilets must be reported to the Supervisor for corrective action or replacement. • Sediment and erosion controls must be designed to contain possible dirty runoff within the drilling pad. This will be achieved with the portable bunding that will be installed around each drilling pad. • Spills must be managed according to a formalised Spill Procedure. Any contaminated soil must be collected into non-permeable bags and disposed of to an approved disposal facility. • For the purpose of future monitoring programmes, impact assessments and rehabilitation, the depth of water strikes must be recorded during exploration drilling. • The static groundwater level must be monitored in each exploration borehole after completion and before rehabilitation for future monitoring, impact assessment and rehabilitation purposes. • All boreholes must be sealed upon completion to prevent ingress of water from surface. • Any completed borehole that is not required for groundwater monitoring, must be sealed and rehabilitated to prevent groundwater contamination. • Rehabilitation of exploration boreholes as well as the site and access tracks must be undertaken upon completion of drilling at each position. Metallurgical low-grade stockpile • All runoff from the site must be contained and diverted to the Upper RWD. No surface runoff may escape into the catchment in an uncontrolled manner.		Detailed report is attached as Annexure 6 and Annexure 8.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	• Groundwater monitoring in the existing monitoring boreholes must continue according to the conditions of the approved WULs, especially in borehole DRM4 situated near the Plant. <u>Truck Parking</u> • The supervisor of this area must receive adequate training regarding the groundwater management programme, Spill Procedure and the use of oil spill kits. • No maintenance of trucks will be allowed in this area. All maintenance must be undertaken at the workshops. • If oil and/or diesel leaks are identified, these must be reported and cleaned up as a matter of priority. <u>Installation of mine additional infrastructure</u> • The diesel storage and transfer system to be installed at North Shaft for use underground, must be constructed according to prescribed standards. This includes containment, dispensing and transferring facilities. • All personnel working with diesel containment, dispensing and transferring equipment and facilities must receive adequate training regarding the requirements of the Spill Procedure, the use of spill kits and the disposal of contaminated material. • Daily inspections must be undertaken at all diesel and oil storage, dispensing and transferring facilities to identify leaks and spills efficiently. Should leaks be detected, these must be contained and cleaned up as a matter of urgency. Contaminated soil must be disposed of to a licensed facility. • Regular inspections must be undertaken at the new change house to monitor for leaks. Should leaks be detected, these should be reported and fixed as a matter of urgency. • Sewage generated at the new change house must be contained and treated to avoid groundwater contamination. It is noted that Dwarsrivier Mine have several sewage plants on site that can be used for this purpose, if a dedicated sewage plant will not be constructed at North Shaft. • The containment of water from the water treatment plant in a reservoir is not expected to impact on groundwater quality.		
Floral Assessment	The proposed Capital Projects are located within the active mining area and affects the Sekhukhune Bushveld and the Transformed Habitats. This area has been fenced off and is subject to a number of mining related edge effects prior to the proposed activities taking place. Given the present condition of this area, the construction and operational activities associated with the Capital Projects are deemed to be of a low risk to floral and faunal species diversity. The drill pads and associated access roads are located throughout all the habitat units identified in the area, but of concern are those located within the intact sections of the Sekhukhune Mountain Bushveld and the Freshwater Habitats. These habitats are of increased ecological importance and sensitivity and are characterised by an abundant and diverse array of floral and faunal species. Furthermore, these habitat units provide niche habitats for species that are not found in any other habitats units in the area. The clearing of vegetation for the drill pads and access roads is considered to pose a significant threat to these niche habitats and the species associated with them. However, provided that the mitigation measures as stipulated in this report are implemented and enforced by the EMPr, these impacts can be reduced to acceptable levels. • Five habitat units were identified during the field assessment, namely: o Sekhukhune Mountain Bushveld Habitat; o Sekhukhune Bushveld Habitat; o Freshwater Habitat Unit;	Yes	Refer to Section 1.g.iv.1.e, Section 1.g.v.4, 1.g.v.5, 1.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. 4 Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.e.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	○ Old Agricultural Lands Habitat; and ○ Transformed Habitat. • The above habitat units play host to an abundant and diverse array of floral and faunal species, many of which are considered to be endemic to the region. The Sekhukhune Bushveld Habitat, Sekhukhune Bushveld Habitat and Freshwater habitat units are significantly more ecologically important and sensitive; • A number of niche habitats were observed, notably within the Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units which are inhabited by several floral SCC such as *Lydenburgia cassinoides*, *Sclerocarya birrea* subsp. *caffra*, *Aloe marlothii* and *Aloe castanea*; • The niche habitats, notably the rocky outcrops and sheet rock areas important for endemic SCC such as *Platysaurus orientalis fitzsimonsi* (Fitzsimons Flat Lizard) and *Hadogenes polytrichobothrius* (Flat Rock Scorpion); • Several other floral SCC were observed during previous studies (BEC, 2013) (Ecorex, 2008) undertaken in the Mining Right Area and are known to occur within the focus area but do not seem to be directly impacted by the proposed mining development; • Several other faunal SCC were observed and are known to occur within the project area, including *Panthera pardus* (Leopard), *Gyps africanus* (White Backed Vulture), *Python natalensis* (African Python) and *Pycna silvia* (Cicada) amongst others; • The Capital Projects layout areas are associated with the Sekhukhune Bushveld and the Transformed Habitat Units. Development in these areas is not considered to pose a significant risk to floral and faunal species, as the proposed developments are located within the active and fenced off mining area; • The proposed drill pads and access roads are of particular concern where they are located within the more sensitive habitat units, notably the Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and the Freshwater Habitat Units; • Vegetation clearing and earth moving activities in these habitat units are likely to result in the loss of preferred floral and niche faunal habitat, loss of floral and faunal SCC and the disturbance of the surrounding sensitive habitat as a result of edge effects; • In order to minimise the perceived impacts to floral and faunal habitat and species it is of paramount importance that the mitigation measures as stipulated in this report are ratified by the EMPr and implemented and that all areas of disturbance are rehabilitated; and • Provided that all recommendations and mitigation measures as stipulated in this report are implemented, the perceived impacts associated with the capital projects, drill pads and access roads can be reduced to acceptable levels. The management measure recommended include: <u>Habitat Unit 1</u> In order to minimise the impact to floral species, the following recommendations are made: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling.; • Drill pads located within the mountainous areas should be restricted to the lower slopes where possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimizing the need for extensive rehabilitation activities; • An Alien and Invasive Plant Control Plan and Erosion Control Plan must be developed and implemented during all phases of development, to lower the risk of erosion and the increase proliferation of alien and invasive plant species within the focus area; and • Permits should be obtained from LEDET and DAFF to remove, cut or destroy any protected tree species before construction of infrastructure takes place.		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	Habitat Unit 2: In order to minimise the impact to floral species, the following recommendations are made: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling. • Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimizing the need for extensive rehabilitation activities; • An Alien and Invasive Plant Control Plan and Erosion Control Plan must be developed and implemented during all phases of development, to lower the risk of erosion and the increase proliferation of alien and invasive plant species within the focus area; and • Permits should be obtained from LDEDET and DAFF to remove, cut or destroy any protected tree species before construction of infrastructure takes place. Habitat Unit 3: In order to minimise the impact to floral species, the following recommendations are made: • Drill pads are to be located outside of the freshwater habitats and the associated buffer zones. All drill pads and access roads are to be rehabilitated post drilling activities; • Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible; • Storm water must be suitably managed and mitigated in order to ensure sedimentation of the freshwater habitats does not occur; • Where drill pads located in close proximity to the freshwater habitats and associated buffer zones temporary berms are to be constructed in order to ensure that sediment laden runoff from the drill sites does not enter into the freshwater systems; • Spills and /or leaks from drill equipment must be immediately remedied and cleaned up so as to ensure that these chemicals do not enter into the freshwater habitat; • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance; and • Permits should be obtained from LDEDET and DAFF to remove, cut or destroy any protected tree species before construction of infrastructure takes place. Habitat Unit 4 In order to minimise the impact to amphibian species, the following mitigations are recommended: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling.; • An Alien and Invasive Plant Control Plan and Erosion Control Plan must be developed and implemented during all phases of development, to lower the risk of erosion and the increase proliferation of alien and invasive plant species within the focus area; and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance. Habitat Unit 5		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	In order to minimise the impact to floral species, the following recommendations are made: • Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible; • All drill pads and access roads must be rehabilitated post drilling activities; • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance; and An Alien and Invasive Plant Control Plan and Erosion Control Plan must be developed and implemented during all phases of development, to lower the risk of erosion and the increase proliferation of alien and invasive plant species within the focus area. <u>Protected Species</u>: The following protected species listed under the National Forests Act (Act 84 of 1998) were observed within the focus area at the time of the assessment: • *Sclerocarya birrea* subsp. *Caffra*; and • *Lydenburgia cassinoides* (also listed as Near Threatened in terms of the National Red Data List). Furthermore, *Balanites maughamii*, also listed as protected under the National Forest Act (Act 84 of 1998), although not observed during the field assessment has an increase probability of occurring within the Sekhukhune Mountain Bushveld habitat unit. In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under license granted by the DAFF a delegated authority. Applications for such activities should be made to the responsible official in each province. Each application is evaluated on merit (including field assessments) before a decision is taken whether or not to issue a licence (with or without conditions). Such decisions must be in line with national policy and guidelines. Additionally, two species listed as protected under the LEMA (Act 7 of 2003) were observed during the field assessment namely: • *Aloe marlothii*; and • *Aloe castanea*. 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 LDEDET. The following additional floral SCC were recorded during previous studies (BEC, 2013) (Ecorex, 2008) done in the Mining Right Area and have a high probability to be present within the Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units as preferred habitat for these floral SCC are present: • *Boophone disticha* (Declining Status, Poisonous, medicinal uses); • *Boscia foetida* (Medicinal uses, LEMA Schedule 12: Protected Plants); • *Chlorophytum* cf. *cyperaceum* (LEMA Schedule 12: Protected Plants); • *Elephantorrhiza praetermissa* (LEMA Schedule 12: Protected Plants); • *Euphorbia* species (LEMA Schedule 12: Protected Plants); • *Gladiolus* species (LEMA Schedule 12: Protected Plants);		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	• *Ledebouria* (*Resnova*) sp.aff. *megaphylla*; and • *Zantedeschia pentlandii* (listed as Vulnerable in terms of the National Red List) Alien Invasive Species: Alien floral species located in the focus area must be removed on a regular basis as part of maintenance activities according to the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations (GN R864 of 2016). It is the opinion of the ecologists that this study provides the relevant information required in order to implement Integrated Environmental Management and to ensure that the best long-term use of the ecological resources in the focus areas will be made in support of the principle of sustainable development. It is recommended that, from a floral ecological perspective, the proposed development be **considered favorably provided that the recommended mitigation measures for the identified impacts (as outlined in Sections 3 and 5 of the specialist study by SAS) are adhered to, and construction within the sensitive habitats is avoided, and where this is not possible, kept to an absolute minimum.**		
Faunal Assessment	Mammals: In order to minimise the impact to mammal species, the following mitigation measures are recommended: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post-drilling; • Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities; • No drill pads are to be located within any freshwater systems or their associated buffer zones as presented in Section 1.k.ii, this will ensure the continued protection of these systems and the mammal species they support through habitat and resource provision; and • Drill pads located in open grassed areas along the Klein and Groot Dwarsriviers, notably in areas of deeper soil must be searched for any signs of mole activity. Should such be found, a suitably qualified specialist is to be contacted in order to advise on the best way forward based on the analyses of the type of moles present. During this time, drilling and vegetation clearance is cease immediately in the area. Avifauna In order to minimise the impact to avifaunal species, the following mitigatory actions are recommended: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling. • Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities; • Removal/ cutting down of large trees (>4m) should be avoided, notably in the riparian areas, valleys between mountain slopes and along the mountain sides, as these are considered important for large raptors, and cannot be readily replaced through rehabilitation; • No drill pads are to be located within any freshwater systems or their associated buffer zones as presented in Section 1.k.ii, this will ensure the continued protection of these systems and the avifaunal species they support; and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance.	Yes	Refer to Section 1.g.iv.1.e, Section 1.g.v.4, 1.g.v.5, 1.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. 4 Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.e.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	Amphibians: In order to minimise the impact to amphibian species, the following mitigatory actions are recommended: • Drill pads are to be located outside of the active channel of the rivers and their associated riparian zones and as well as a 32m buffer zone. All drill pads and access roads are to be rehabilitated post drilling activities; • Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible; • Storm water must be suitably managed and mitigated in order to ensure sedimentation of the freshwater habitats does not occur; • Where drill pads are located in close proximity to the freshwater habitats and associated buffer zones temporary berms are to be constructed in order to ensure that sediment laden runoff from the drill sites does not enter into the freshwater systems; • Spills and /or leaks from drill equipment must be immediately remedied and cleaned up so as to ensure that these chemicals do not enter into the freshwater habitat; and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance. Reptiles In order to minimise the impact to mammal species, the following mitigations are recommended: • All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling; • Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities; • Drill pads should avoid rocky outcrop and areas of sheet rock as far as practically possible, as these are primary habitat for the reptile SCC *Platysaurus orientalis fitzsimonsi* (Fitzsimon's Flat Lizard); and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance. Insects In order to minimise the impact to amphibian species, the following mitigations are recommended: • Drill pads are to be located outside of the freshwater habitats and the associated buffer zones as presented in Section 1.k.ii; • All drill pads and access roads are to be rehabilitated post drilling activities; • Footprint sizes of the drill pads, access roads and capital layout areas are to remain as small as possible; • Drill pads and access roads are to avoid areas where stands of *Vitex obovata* subsp *wilmsii* are located. Where drill pads and access roads are located within stands of *Vitex obovata* subsp *wilmsii*, these should be relocated to an area outside of these stands. These trees are often associated with the drainage lines and as such avoidance of these areas will ensure that the risks posed to *Pycna sylvia* are reduced; and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance. Arachnids In order to minimise the impact to arachnid species, the following mitigatory measures are recommended:		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	• All drill pads and access road footprints are to be kept as small as possible and are to be rehabilitated post drilling; • Drill pads located within the mountainous areas should be restricted to the lower slopes as far as practically possible, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities; • Drill pads should avoid rocky outcrops and areas of sheet rock, as these are primary habitat for arachnid SCC such *Hadogenes polytrichobothrius*; • Prior to vegetation clearing activities in the Sekhukhune Bushveld habitat, the sites should be inspected for the presence of baboon spider burrows. If located, these species should be carefully excavated by a suitably qualified specialist ensuring no harm to the spider, and relocated to similar surrounding habitat outside of the footprint area; and • As far as possible existing access roads are to be used to gain access to the new drill pad sites in order to minimise the need for additional vegetation clearance. <u>Species of Conservational Concern</u> The Capital Project areas have been impacted in areas as a result of the development and expansion of mining related infrastructure as well as associated mining activities. Furthermore, communities do have access to some of the areas in which the graze their cattle, although the impact from this is considered to be low as only a few cattle appear to be present. Past agricultural activities and current mining and exploration activities have had the largest impact in the surrounding habitat and faunal species composition. The construction of fences has impact upon larger faunal species movement, however, it was observed that faunal species are making use of the under road culverts as access corridors between fenced areas. The drill pads and new access roads will pose the greatest threat to faunal SCC, notably through disturbance and loss of niche habitat. Drilling in the Sekhukhune Mountain Bushveld poses a significant threat to small SCC such as *Platysaurus orientalis fitzsimonsi* and *Hadogenes polytrichobothrius* which are restricted to the rocky outcrops and sheet rock areas. Drilling in the riparian areas and associated ecotonal areas of the Riparian and Sekhukhune Bushveld areas poses a further risk to species such as *Chrysospalax villosus* as well as the freshwater systems and associated species which rely on this habitat. Clearing of large trees in drill pad areas will further result in the loss of roosting and nesting sites for raptors. Many of the drill pad locations will require the clearing of *Vitex obovata* subsp *wilmsii,* a tree species which has been associated with the Cicada species *Pycna silvia*. This may have a significant negative impact on the current population of this species in the Klein Dwars Valley		
Freshwater Ecosystems	Possible significant impacts, business case, conclusion and mitigation requirements for Groot Dwarsrivier and Springkaanspruit • Based on the initial layout provided by the proponent, two alternatives (i.e. Option 2 and Option 3) for the proposed truck parking area are located within 100m of the Groot Dwarsrivier. From a freshwater resource perspective therefore, Option 1 is the preferred alternative for the proposed truck parking area; • The proposed drilling plan indicates that several drill pads are located within the floodplain and the 1:100 year flood line associated with the lower reaches of the Groot Dwarsrivier near its confluence with the Klein Dwarsrivier. Potential impacts to the floodplain area which may arise as a result of the proposed exploratory drilling include: loss of vegetation, increased risk of proliferation of alien vegetation due to the disturbances, significant impacts to the hydraulic processes, loss of biota within the riparian zone, loss of wetland habitat, significantly increased sedimentation of the system as a result of disturbances to the soils, altered soil profiles leading to altered hydropedological processes, and contamination of wetland soils and surface water;	Yes	Refer to Section 1.g.iv.1.i Section 1.g.v.4, 1.g.v.5, 1.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. 4. Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.i The report was also considered in the decision on the Truck Parking and

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.

	• It is therefore the opinion of the ecologist that exploratory drilling within the flood lines should not be permitted. However, should the activity be authorized, very well-developed mitigation measures will need to be very strictly adhered to throughout all phases of the proposed activity, including (but not limited to):
	  ◦ Drilling must only be undertaken during the dry winter period, in order to limit the necessity for any diversions of the river that may be required, as well as to minimise the risk of sedimentation;
	  ◦ The footprint of disturbance, particularly vegetation clearing, must be kept to the absolute minimum that is required to carry out the drilling;
	  ◦ The delineated floodplain/riparian and flood line areas are to be strictly out of bounds to all but essential personnel and exploration equipment;
	  ◦ Removed soils must be carefully retained (and suitably protected for the duration), and carefully replaced as soon as drilling is completed;
	  ◦ Regular monitoring for alien vegetation recruitment and erosion must be developed and implemented concurrently with drilling. All alien vegetation and erosion noted must be appropriately dealt with as soon as it is noted.
	
	In addition to the above, it was noted by the specialist that the proponent is intending to under-mine the Groot Dwarsrivier. At the time of this assessment, details pertaining to this proposed activity had not been finalised, however, according to the EAP (Pers. Comms. T. Bekker, 2018) the depth of under-mining will be in excess of 300m, therefore little risk is posed to the ecological integrity of the system as a result of this activity. Nevertheless, this must be confirmed by a suitably qualified geohydrologist.
	
	<u>Possible significant impacts, business case, conclusion and mitigation requirements – Klein Dwarsrivier:</u>
	
	The proposed drilling plan indicates that numerous drill pads are located within 10m of the active channel, within the floodplain and the 1:100 year flood line associated with the reach of the Klein Dwarsrivier within the Mining Right Area. Potential impacts which may arise as a result of the proposed exploratory drilling include: loss of vegetation, increased risk of proliferation of alien vegetation due to the disturbances, loss of biota, loss of wetland habitat, significantly increased sedimentation of the system as a result of disturbances to the soils, altered soil profiles leading to altered hydropedological processes within the floodplain area, and contamination of wetland soils and surface water.
	
	It is therefore the opinion of the ecologist that exploratory drilling within the active channel and floodplain associated with the Klein Dwarsrivier should not be permitted. However, should drilling within the 1:100 year flood lines be authorised, very well-developed mitigation measures will need to be very strictly adhered to throughout all phases of the proposed activity, including (but not limited to):
	
	• No drilling should be permitted within 32m of the active channel (in consideration of NEMA regulations) in order to minimise direct impacts on the instream ecology of the river;
	• Drilling must only be undertaken during the dry winter period within any areas under the flood line, in order to limit the necessity for any diversions of the river that may be required, as well as to minimise the risk of sedimentation;
	• The footprint of disturbance, particularly vegetation clearing, must be kept to the absolute minimum that is required to carry out the drilling. In this regard particular mention is made of access roads. Access roads must not be developed in parallel to the watercourse but must enter at the shortest distance from the adjacent areas above the flood line. Furthermore, the same entry and exit track should be used and no additional disturbance should take place;
	• The delineated floodplain/riparian and flood line areas are to be strictly out of bounds to all but essential personnel and exploration equipment;
			Exploration Drilling locations see Sections 1.g.i.1.a.1 and 0.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	• Removed soils must be carefully retained (and suitably protected for the duration), and carefully replaced as soon as drilling is completed; • Regular monitoring for alien vegetation recruitment and erosion must be developed and implemented concurrently with drilling. All alien vegetation and erosion noted must be appropriately dealt with as soon as it is noted. In addition, numerous drill sites are planned on the upgradient slopes to the west of the Klein Dwarsrivier. Whilst these are unlikely to have a direct impact on the river, it is imperative that soil management measures be implemented at each of these sites to prevent excess sediment from stockpiles etc. entering the river. This includes covering temporary soil stockpiles, preferably limiting the activity to the dry season, and preventing removal of vegetation downgradient of each site. <u>Possible significant impacts, business case, conclusion and mitigation requirements: Dwarsrivier</u> As with the Klein Dwarsrivier, numerous drill pads are indicated to be within 10m of the active channel of the Dwars River, as well as within the riparian zone and the 1:100 year flood line. Terrain on either side of the Dwars River, particularly the reach immediately downstream of the confluence between the Klein and Groot Dwarsrivier, is very steep. Any mining related activities within those areas especially, are likely to impact negatively on the river in terms of sedimentation and contamination of surface water due to the gradient of the banks. Potential impacts associated with the proposed drilling within the riparian zone and 1:100 year flood line of the Dwars River will be similar to those described for the Groot Dwars and Klein Dwarsriviers, however, some impacts (such as sedimentation of the river) may be increased due to the terrain. Drilling within the areas described around the Dwars River is not supported as impacts are deemed to be unacceptably high. Should the proposed drilling activities be authorised however, it is imperative that mitigation measures as outlined in this report (Tables 7 and 8, and Section 6 of this report) are very strictly adhered to. <u>Possible significant impacts, business case, conclusion and mitigation requirements: Unnamed tributary south</u> Numerous drill sites are indicated within the active channel and riparian zone of this system. Whilst flood lines for this system were not available at the time of this assessment, it is conceivable that drill sites are also located within the 1:100 year flood line. Although this system is non-perennial and is therefore of marginally less ecological importance and sensitivity than the larger, perennial systems in the Mining Right Area, it is nonetheless of increased ecological integrity. As with all other drainage systems assessed, potential impacts to this system should the proposed drilling proceed include: loss of instream and riparian connectivity due to drilling within the active channel, possible formation of swallets due to disturbances to underlying soils and geology, altered hydraulic patterns and hydropedological processes, loss of vegetation and habitat, increased risk of incision and erosion, and increased sedimentation of the system (which may in turn impact on the downstream system, i.e. the Klein Dwarsrivier). Drilling activities within the 1:100 year flood line, and the delineated drainage system, are not supported for these reasons. However, should the activity be authorised, then the mitigation measures outlined should be implemented. <u>Possible significant impacts, business case, conclusion and mitigation requirements: Unnamed tributary North</u> No capital infrastructure or exploratory drilling is currently indicated to occur within this drainage system, or within 100m thereof. Thus, no direct impacts to this system are anticipated as a result of the proposed expansion. However, it must be noted that some drill pads are located upgradient of the system, albeit over 250m away. Mitigation measures at these sites must therefore include erosion control and soil management measures in order to minimise the risk of sediment reaching the stream, and it is recommended that monitoring of the stream for erosion/incision and excess sedimentation take place on a monthly basis whilst drilling is underway in that vicinity.		

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	Possible significant impacts, business case, conclusion and mitigation requirements: Ephemeral Drainage Lines West A few exploratory drill sites are indicated directly within some of these ephemeral drainage lines. Whilst the significance of impacts associated with such activities may not be as high as within the larger, more sensitive systems, drilling within the ephemeral drainage lines is nevertheless strongly discouraged. Potential impacts which may occur are similar to those described previously, i.e. loss of hydraulic connectivity and alteration to hydropedological processes, vegetation losses and geomorphological processes. Mitigation measures previously described in Tables 7 and 8 of the Freshwater and Aquatic Assessment - Annexure 6 remain applicable, should the drilling within the ephemeral drainage lines be authorised. Additionally, it is strongly recommended that the delineations provided in this report be taken into consideration during the planning phase, and the planned drilling schedule be revised to exclude the ephemeral drainage lines. Possible significant impacts, business case, conclusion and mitigation requirements: Possible significant impacts, business case, conclusion and mitigation requirements: Ephemeral Drainage Lines East No drill sites are indicated directly within any of the eastern ephemeral drainage lines, although several encroach marginally on the riparian zones associated with the drainage lines. It is therefore strongly recommended that the delineations provided in this report be taken into consideration during the planning phase, and the planned drilling schedule be revised to exclude the ephemeral drainage lines, and any flood lines which may be applicable to these systems. As with the western ephemeral drainage lines, the significance of impacts associated with the proposed activities is lower than in the larger drainage systems, due in part to the decreased ecological integrity of the systems, and partly due to the position of the drill sites. Nevertheless, impacts are expected, including loss of riparian vegetation (and therefore riparian habitat), increased risk of bank incision and erosion, possible formation of preferential surface flow paths in the disturbed areas leading to increased risk of sedimentation during rainfall events, and alteration to hydropedological processes which may affect recharge of the systems. Mitigation measures previously described in Tables 7 and 8 of the Freshwater and Aquatic Assessment - Annexure 6 therefore remain applicable, should the drilling within the riparian zones of the ephemeral drainage lines be authorised.		
Flood lines	The area between the old TSF and Discard Storage Facility, where the truck parking option 1 is proposed, was thoroughly assessed during a site visit. A remnant drainage line was noted in the area, that consisted of a shallow channel directly south-east of the Discard Storage Facility, but was noted to be more defined further downstream. Two contributing catchments were delineated; catchment 1 took the clean cut-off trench into consideration, while catchment 2 ignored the trench. The 1:50 and 1:100 year flood lines indicated that the truck parking option 1 falls outside of the flood lines in both instances (catchment 1 and 2), but within the 100 m buffer of the drainage line. The 1:50 and 1:100 year flood lines were determined for the drainage lines that intersect the proposed Drilling Plan. A number of drilling targets and access roads are located within the flood lines and 100m buffer. The following is recommended: - The clean cut-off trench upslope of truck parking option 1 is upgraded. This includes unlocking the culvert near the Sekhukhune road, which may require the installation of a new culvert, due to its poor condition. It is recommended that should a new culvert be considered, that it is sized correctly to convey the 1:50 year runoff, as required by the GN704 Regulations. It is further recommended that a culvert is considered where the road has blocked the trench. Lastly, the sizing of the clean cut-off trench should be checked, to ensure that it complies with GN704;	Yes	Refer to Section 1.g.iv.1.d 1.g.v.4, 1.g.v.51.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. 4 Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.f.1. The report was also considered in the decision on the Truck Parking and Exploration Drilling locations see Sections 1.g.i.1.a.1 and 0.

List of studies undertaken	Recommendations of specialist reports	Specialist recommendations that have been included in the EIA report	Reference to applicable section of report where specialist recommendations have been included.
	• Truck parking option 1 falls outside of the 1:100 year flood lines, but within a 100m horizontal distance of the drainage line. It is recommended that a GN704 exemption from Regulation 4 (a) and (b) is obtained; • The proposed drilling holes and access roads that fall within the 1:50 year flood lines, and within a 100 m horizontal distance of the drainage lines, are exempted from GN704 regulations 4 (a) and 4 (b); • In order to minimise the impacts of the drilling sites located within the flood lines, it is proposed that they are only accessed during the dry season; and • A 100m buffer has been placed around the Richmond dam, however, this should be confirmed with the DWS.		
Heritage	Large portions of the study area are characterised by existing mining operations that would have impacted on surface indicators of heritage sites and apart from isolated widely scattered MSA artefacts (of low significance) no archaeological sites of significance were recorded during the survey for the Capital projects and Diesel Storage. In terms of the exploration programme two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50m buffer zone around the sites. The study area is indicated as of low to insignificant palaeontological sensitivity on the SAHRA palaeontological map. This is corroborated by a paleontological study (Rossouw 2017) that found that the Dwarsrivier mine area is underlain by paleontologically insignificant intrusive igneous rocks and there is little chance of finding fossil material. The well-known geological monument referred to as the "Dwarsrivier National Monument" is located close to some of the drill pads and will have to be preserved with a buffer zone of 100m. No further mitigation prior to construction is recommended in terms of the archaeological and paleontological components of Section 35 for the proposed development to proceed. In terms of the built environment of the area (Section 34 of the NHRA), no standing structures older than 60 years occur within the impact areas for the Capital Projects and Diesel Storage (including decommissioning of existing facilities). Several buildings were however identified from the desktop study close to drill pads and should be avoided with a 30m buffer zone. In terms of Section 36 of the NHRA several burial sites are known to exist in the larger project area. However no burial sites are on record for the areas of impact. If any graves are located in future they should ideally be preserved *in situ* or alternatively relocated according to existing legislation. The area is extensively mined and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns was raised. According to the Specialist Study, the impact of the proposed project on heritage resources is considered low and no further pre-construction mitigation in terms of archaeological resources is required based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures (i.e. chance find procedure) are implemented for the project. The impact of the proposed project on heritage resources can be mitigated and it is recommended that the proposed project can commence on the condition that the recommendations made in this report is implemented as part of the EMPr and based on approval from SAHRA.	Yes (all)	Refer to Section 1.g.iv.1.d 1.g.v.4, 1.g.v.51.i and Impacts Table in Section 1.g.v.5 and Part B, Section 1.e. Detailed report is attached as Annexure 6 and summarised in Section 1.g.iv.1.l.

1.k Environmental Impact Statement

1.k.i Summary of the key findings of the EIA

Below, please find a summary of the key findings pertaining to the environmental authorisation application based on the outcomes of the specialist investigations:

1.k.i.1 Other License Requirements

A Water Use Licence Application (WULA) has not yet been submitted. A WULA will be submitted prior to the commencement of the proposed project. No activities will be undertaken without the necessary approvals.

The WUL will not only cater for this project, but will be an update of the overall mine WUL to correct all changes and administrative errors. For this project, the following activities may trigger water uses as indicated:

- Section 21c&i applications for exploration roads, where these may cross non-perennial drainage channels;
- Section 21b for the storage of water;
- GN704 exemption for the location of infrastructure within the 100m buffer from watercourses, this may be for the Truck Parking, Product Stockpile and Exploration Activities;
- GN704 exemption for the use of discard rock in the construction of berms, roads and parking areas; and
- Section 21g for the construction of the Product Stockpile.

1.k.i.2 Capital Projects including Diesel Storage and Supply

Alternatives:

In terms of alternatives, the Truck Parking raised the key assessment in terms of location with the provision of three (3) options. Based on the various specialist studies undertaken, none of the options presented a fatal flaw. However, Option 1 was identified as the most preferred site in terms of the hydrological, soils, ecological and freshwater ecosystem considerations. This facility will be located outside of the 1:100 year flood line, but will still require exemption from GN704 from the DWS due to its location within 100m of a watercourse.

Due to further investigations required, the discharge of fissure water into the Dwarsrivier has been excluded from this Environmental Authorisation Application Process.

Logistics:

During the planning phase of the various proposed Capital Projects, no specific impacts will take place directly, however, poor planning during this phase could result in significant project delays. This will be due to WULA, Environmental and Road Upgrade Authorisations not being in place and/ or agreements not being in place between all surface landowners where applicable to enable access.

During the construction phases of the activities, there is the possibility of impacting on the logistical arrangements of adjacent mines, such as Two Rivers Platinum. This is due to the upgrades which will be required on the regional access road, which is also utilised by Two Rivers Platinum for personnel and product transportation. The establishment of infrastructure for the exploration activities may also impact Two Rivers Platinum, as several of the drilling sites are located in close proximity to areas where operational activities of the said mine is being undertaken, notably the Plant and the TSF.

Soils and Land Capability:

From a soil and land capability point of view, this proposed Capital Projects are not regarded as being fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be considered and implemented accordingly in efforts to conserve soil resources.

Ecology (fauna and flora):

The proposed capital projects are all located within the existing active mining area, and as such, the impacts associated with the various projects are expected to be of low to medium-low significance prior to the implementation of mitigation measures. With the cognisant implementation of mitigation measures, these impacts can be minimised to low and very-low significance.

Aquatics and Freshwater:

Based on the findings of the aquatic and freshwater assessment, the proposed development of capital infrastructure generally poses a low risk to the freshwater resources due to the distance of the planned infrastructure from freshwater resources. Nevertheless, the adherence to cogent, well-conceived mitigation measures as well as general good construction practice will aid in reducing the impact significance to acceptable levels.

Hydrology:

During the site visit, a remnant drainage line/ ditch was noted between the old TSF and Discard Storage Facility in the vicinity of Truck Parking Option 1. This drainage line was previously diverted to prevent flooding of open pit operations, which have since been rehabilitated. The diversion is still currently in place, and diverts runoff away from the North RWD, and into the Springkaanspruit. Truck Parking Option 1 falls outside of the flood lines, but within the 100m buffer of the drainage line. It is therefore unlikely that the proposed truck parking will disturb the drainage line or be at risk of flooding. However, the elevated area (approximately 1.5m to 3m elevation difference) on which the truck parking is proposed, should be kept in place, as it provides important elevation for the left bank of the drainage line. Due to the truck parking facility being located within the 100m buffer of the drainage line, it is likely that a GN704 exemption from Regulation 4(a) and (b) will be required.

Hydrogeology:

The mine proposes to use discard rock for road and truck stop construction. Recent leach tests on the discard rock material indicate that the majority of leachable elements were below the laboratory detection limits. As such, the use of the rock as fill material is not expected to impact significantly on groundwater quality during the operational phase of mining and post-closure.

Heritage:

From a heritage perspective, no areas of concern were identified where the Capital Projects are planned. The impact of the proposed project on heritage resources can be mitigated and it is recommended that the proposed project can commence on the condition that the recommendations made in this report are implemented as part of the EMPr and based on approval from SAHRA.

1.k.i.3 Exploration Activities

Alternatives:

The location of the resource and reserve drilling programme is directly linked to the approved Mining Right Area. The demarcation of the drilling sites is as per a specific drilling plan with an exploration site located every 150m. Various considerations were taken in the decision of the final location of the exploration drilling site placement:

- Sites are subject to the rules and requirements of surface right owners. Although the exploration activities are planned over the Dwarsrivier Mine Mining Rights, this will extend onto the Two Rivers Platinum Surface Rights area. The area where Dwarsrivier Mine will deviate from the drilling layout previously considered during the Scoping Phase, will be around infrastructure such as the Two Rivers Platinum TSF and Two Rivers Platinum Plant. Drilling will however still be located within the same property and approximate location.
- The freshwater/ wetland study indicated a 32m buffer around riparian areas.
- The required buffers as identified by the heritage study will be adhered to.
- In terms of the flood line assessment, various ephemeral (only flowing in response to high rainfall) drainage lines are present on site. Dwarsrivier Mine has committed to exclude all areas within the 1:100 year flood lines from the drilling activities.

The final exploration drilling map is indicated in Figure 6.

Based on the above, 5% of the drill sites previously considered have been excluded from the final project plan

It is key to note that the outcomes of the location recommendation of the exploration activities and drill sites in terms of this EIA are based on the specialist investigations and have not considered the required safety considerations required in comprehensive exploration drilling. It is therefore important that the applicant ensures that the exploration drilling is undertaken in such a manner as to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

Soils and Land Capability:

Potential arable soils (Bonheim) will be slightly impacted by the proposed drilling and exploration activities to the north of the Mining Rights Area since the current drilling layout intrudes on these soils; this will however be further mitigated by excluding the 1:100 year flood line from the drilling activities. From a soil and land capability point of view, this project is not regarded as fatally flawed due to various soils constraints for commercial agricultural production, however mitigation measures and recommendations outlined in this document need to be strongly considered and implemented accordingly in efforts to conserve soil resources.

Ecology (flora and fauna):

The impact significance associated with the construction of drill pads and access roads is notably higher than that of the Capital Projects, as the associated footprints are predominantly located in areas of increased sensitivity and are likely to impact upon several floral and faunal SCC and preferred/ niche habitats. Prior to the implementation of mitigation measures, the perceived impacts are of medium-low to medium-high significance for the areas of increased sensitivity, and low to very low in the less sensitive areas e.g. Transformed and Old Agricultural Lands Habitat Units and disturbed habitats. With the implementation of mitigation measures as stipulated in this report, the impacts associated with the sensitive habitats e.g. Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and Freshwater Habitat Units can be decreased to low and medium low significance, whilst the impacts associated with the less sensitive habitats e.g. Transformed and Old Agricultural Lands Habitat Units can be decreased to a very low significance.

Aquatics and Freshwater:

Based on the findings of the aquatics and freshwater assessments and the results of the impact assessment, it is the opinion of the ecologist that some aspects of the proposed exploration expansion project, specifically the planned exploratory drilling within watercourses, carries the potential to pose a significant and unacceptably high cumulative risk to several important and sensitive drainage systems in the area most notably the Groot Dwarsrivier, Klein Dwarsrivier and Dwarsrivier, which may in turn have an indirect impact on the functioning of downstream systems, including the Steelpoort River. It is recommended that the proposed drill plan be revised to exclude the active channels, delineated floodplains and delineated riparian zones of all watercourses (32m) within the Mining Right Area. Drilling within the 1:100 year flood line carries the potential to have a significant impact on the receiving environment, however the impact significance may be reduced by strict adherence at all times to well-developed mitigation measures. For this reason the applicant has committed to exclude all drilling activities from the 1:100 year flood lines. Access roads will be restricted as far as practically possible to existing roads and where crossings are required, such will be undertaken in terms of the specialist recommendations.

Hydrology:

A number of drilling targets and access roads were initially located within the flood lines and 100m buffer. The project plan has been amended to exclude all drilling pads from the 1:100 year flood lines.

Hydrogeology:

- Intersection of groundwater during exploration drilling

The groundwater table will be intersected during exploration drilling. The existing dataset confirms that the average depth to groundwater is 7,5m. Due to the fact that biodegradable drilling fluids will be used, groundwater contamination associated with exploration drilling is not expected to be significant.

Exploration drilling must not take place on the alluvial aquifer. This aquifer is vulnerable to surface sources of contamination, like oil and diesel spills, due to its shallow depth and high permeabilities. Contamination of this aquifer will result in adverse and most probably irreversible impacts on groundwater, as well as the Dwarsrivier and Groot Dwarsrivier.

No groundwater will be abstracted during the drilling programme and water required will be trucked in. For this reason, exploration drilling will not cause a lowering in groundwater levels nor compete with existing groundwater abstraction.

Road construction is not expected to significantly impact on groundwater availability or quality, provided that oil and diesel spills do not occur.

The impact of exploration drilling on groundwater quality and availability is not considered significant due to the limited extent and short duration of activities at each drill pad.

- Oil and diesel spills

Uncontained and unmanaged oil and diesel spills associated with infrastructure development will result in contamination of the underlying aquifers. The shallow weathered and alluvial aquifers are especially vulnerable to groundwater contamination.

- Under-mining of rivers and streams

Available information suggests that rivers and streams will be undermined if the outcome of the proposed exploration programme is positive and underground mining is expanded. A mine plan is not available at present as this will be dependent on the exploration programme outcomes, but it is estimated that the depth of mining would be around 300m below surface.

The results of impact assessments undertaken for the existing underground mining activities (iLEH, 2015) suggests that the most significant impact on the upper weathered and alluvial aquifers is a result of groundwater abstraction for water supply to the mine and not from underground dewatering. The mine is in the process of reducing its dependence on groundwater abstraction from the alluvial aquifer. This water will be partially replaced by water from the WTP. Simulations undertaken as part of the 2015 assessment indicate that the impact of underground dewatering is not uniform across the mining area. In areas of shallower under-mining, groundwater levels in the upper weathered and alluvial aquifers may be lowered by 3 – 4m as a result of underground mine dewatering. In these areas, a reduction in the groundwater component to stream base flow was estimated to be between 18 and 98m^3/d, depending on the depth and extent of mining.

Based on the current understanding of the interaction between the shallow weathered and alluvial aquifers and the underground workings, it is unlikely that mining at depths of 300m and deeper would significantly impact on the overlying rivers and streams. If the groundwater component to stream base flow is to be reduced as a result of mining at these mining depths, the reduction will probably be closer to the lower range reported above, around 20m^3/d. *This assessment will be confirmed upon completion of the detailed groundwater study that is currently underway, which will be included into the final EIA Report.*

A preliminary assessment is therefore presented that the under-mining of rivers and streams will most probably not result in a significant impact over the life of the operations. Post-closure, groundwater levels will recover and residual impacts will reduce with time, most probably within 30 – 80 years of the completion of mining.

Heritage:

From a heritage perspective, areas requiring management were identified, however, none of these will be directly impacted. According to the specialist, the impact of the proposed project on heritage resources can be mitigated and it is recommended that the proposed project can commence on the condition that the recommendations made in this report is implemented as part of the EMPr and based on approval from SAHRA.

1.k.i.4 General

According to the assessment carried out by the EAP the majority of the impacts can be reduced to a medium to low significance with the appropriate mitigation measures in place. This is specifically due to the fact that the mine has committed to the incorporation of the specialist recommendations into their exploration drilling programme.

The overall project as presented in this report is therefore presented with the view of reducing long term rehabilitation requirements.

The following mitigation measures are crucial and should form part of the Environmental Authorisation to ensure that the applicant manages impacts adequately:

- Note that laydown areas will only be placed in areas which are demarcated for permanent activity or existing disturbed areas to ensure that no additional areas are disturbed.
- Ensure that the activities are planned in line with the no-go zones indicated in this document and by the specialist studies – see Section 1.k.ii;
- Ensure that the no-go zones are clearly defined and indicated on the surface layouts and design plans;
- Ensure that all design drawings include effective erosion control measures;
- Adhere to the proposed conceptual Storm Water Management Plan contained in the Hydrological Report and also stipulated in Section 1.g.v.5.
- Adhere to the construction requirements as stipulated in the Freshwater and Aquatic Assessment, in the event that drainage lines require temporary crossings – see Section 1.g.v.5;
- Ensure that training on the EIA and EMPr and the final decision by the DMR is given to all contractors and employees directly involved in the planning, construction and operation of the projects in question;

- Adhere to all management measures and actions presented in this report;
- Demarcate all floral SCC and/ or protected floral species prior to site clearance and apply for the necessary tree and vegetation removal permits;
- No activities which require WULs or approval from the DWS may commence without the necessary authorisations; and
- The rehabilitation of activities on the Two Rivers Platinum Mine surface rights area should be undertaken in consultation with the landowner and signoff upon completion should be obtained from the landowner to indicate agreement with the rehabilitation outcomes.

It should also be noted that the demand for chrome has increased globally due to the increase in China Markets. Not allowing the exploration activities will result in a lost opportunity to understand the optimal mining potential within the area, not only based on economic considerations, but also in terms of safe mining considerations, as the drilling programme will determine the geological structures also present in more detail.

Not allowing activities such as the Truck Parking Area and the new Low-Grade Product Stockpile area, will further lead to a restriction on the volume of this material to be produced and dispatched to the required markets. This will result in restricting the mine to market and supply available reserves, and could impact on the economics of scale of the mining operation.

The Capital Projects and fuel and oil storage project are important to the mine to optimise operational logistics within the Mining Right Area, and by not allowing the formalisation and improvement of activities such as proposed at the Security Access area, North Mine Infrastructure and South Mine Laydown area, would result in a lost opportunity for the mine in terms of continuous improvement.

In conclusion, it is important to take consideration of the manner in which the recommendations by the specialists have been incorporated into and transformed the final project map. The EAP responsible for the compilation of this document and in undertaking the associated Public Participation Process are of the opinion, based on the presented specialist assessments, impact assessment proposed and management plan that the environmental authorisation in support of the Capital Projects and Exploration Drilling Programme can be granted.

1.k.ii Final Site Map

Key aspects of the specialist studies were considered in the finalisation of the final site map. The two sections hereafter provides a concise discussion on the required buffers, which has led to the elimination of various planned boreholes as part of the exploration programme.

It is key to note that the outcomes of this EIA in terms of the location of the drilling pads, are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensure that the exploration drilling is undertaken to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

1.k.ii.1.a.1 Heritage Considerations

Table 56: Identified sites and buffer requirements

Site	Location	Buffer Requirements	Significance
Iron Age			
SIA 1	S24°57’ 58.3” E30° 05’ 52.9”	50m	Not assessed by Stegmann and Roodt (2012)
SIA 2	S24° 58’ 08.5” E30° 05’ 53.8”	50m	Not assessed by Stegmann and Roodt (2012)
Monument			
Monument	S24° 54' 36.4754" E30° 06' 11.4287"	100m	High
Structures			
Structures 1 (Sarashof)	S24° 54' 35.3477" E30° 06' 06.4004	30m	To be Confirmed (TBC)
Dwarsrivier 1 (Farmhouse and Outbuilding)	S24° 55' 02.5012" E30° 05' 58.9384	30m	TBC

Dwarsrivier 1 (Farmhouse and Outbuilding)	S24° 55' 43.0380" E 0° 06' 21.3071"	30m	TBC
Graves			
Burial Sites (01/3)	S24 56' 58" E30 06' 08"	50m	High

1.k.ii.1.a.2 Sensitivity Mapping

The delineations as presented are regarded as a best estimate of the riparian and temporary zone boundaries based on the site conditions present at the time of the assessment and considers the specialist study and legislative requirements. For this reason, a 100m zone of regulation in line with Regulation GN704 of the NWA is applicable to any drainage systems which may be affected by specific mining infrastructure, such as the drill pads, expansion of stockpile areas and so forth. In addition, in terms of Regulation 509 of the NWA, a 100m zone of regulation is applicable to any riparian area, in the absence of a determined 1:100 year flood line, and a 500m zone of regulation in line with Regulation 509 of the NWA is also applicable to any wetland identified within the Mining Right Area. For this reason, a 500m zone of regulation is thus applicable to the floodplains associated with the Klein Dwars, Groot Dwars and Springkaanspruit, as depicted in Figure 78 and Figure 79. It should be noted that since the poorly defined drainage line situated between the TSF and the Discard Storage Facility is not considered, from an ecological perspective, to be a watercourse, the zone of regulation in terms of GN704 is not depicted in this report, and must be obtained from Hydrospatial (2018).

However, a 32m zone of regulation in accordance with NEMA may also be applicable, during the construction of non-mining infrastructure such as access roads, the new truck parking, security office etc. should the areas required be in excess of $10m^2$. It is however acknowledged that linear developments (such as additional access roads) may need to traverse drainage systems and therefore cannot be entirely excluded from the applicable zones of regulation. Thus, it is essential that strict implementation of well-developed, cogent mitigation measures takes place, to prevent unnecessary impacts on the affected drainage systems particularly during construction. Additionally, the mitigation hierarchy must be followed, and impacts which cannot be practicably avoided, minimised or rehabilitated must be offset. This is applies especially to the residual impacts associated with the proposed drilling within active channels and flood lines, and associated loss of riparian habitat which will occur as a result.

The respective zones of regulation in terms of Regulations GN509 and GN704 of the NWA, and the NEMA, are depicted in the figures below. Note the 100m and 500m buffer indicates where approval from the DWS is required in terms of the location of wetlands. This buffer will not restrict activities, but will require approval from the DWS.

Activity restrictions are based on:

- 1:100 year flood lines (see Section 1.g.iv.1.g.4);
- Location of heritage buffers;
- Restriction of the Bonheim soils;
- 100m buffer around the Richmond Dam; and
- 32m buffer around riparian zones.

Other considerations would also be:

- To limit any permanent structures on sensitive soil types, such as the Hutton, Arcadia, Rensburg and Bonheim forms (refer to Figure 29 and Figure 30). The impact on these soils have been reduced significantly be excluding the 1:100 year flood lines from the drilling activities. It is important that the project team ensure that these soils are also avoided as far as practically possible with the construction of the temporary access roads. The Capital Projects should not have any negative impacts on the soils.
- Where roads are required for temporary access roads to the drill pads, these should not include excavations of more than $10m^2$ where possible within 32m of watercourses unless approved in terms of the NEMA and NWA;
- No new roads may be constructed within the main river systems (Groot and Klein Dwarsrivier, as well as the Dwarsrivier, or the Springkaanspruit);
- Only existing access roads will be used in the Sekhukhune Mountain Bushveld areas, with specific mention of the steep slopes. Outcorops will be restricted from activities. Where absolutely necessary, tie offs from the existing exploration roads will be constructed to access specific drill points (excluding outcrops again), but these will be designed to be kept to the absolute minimum;

- Where possible drilling in the rocky outcrops (refer to Figure 29) should be avoided if possible, and where critically required the establishment of drill pads should be undertaken in such a manner as to fully rehabilitate this area.
- Activities on fallow lands should be avoided. The area where some drilling (about four boreholes) are planned, are linked to the already approved extension of the Discard Storage Facility footprint and a future Eskom Substation. Any drilling should in these areas be limited to the approved footprints of future infrastructure and not on areas not earmarked for clearance.
- Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities.
- Removal and or destruction of protected and sensitive species (see Figure 58 and Figure 59), especially the *Lydenburgia cassinoides*, must be avoided at all costs. These species must be demarcated during the planning phase and excluded from any activities or where required specific permits must be obtained where unavoidable. Specific attention should be given around the Truck Parking area, the northern portion of the exploration drilling area, and the south western corner of the exploration drilling area.

Please refer to the final draft site map for the drilling activities specifically (Figure 82). Note that as part of the exploration programme some of the drilling points may be relocted. However, these relocations will be subject to the above mentioned restrictions.

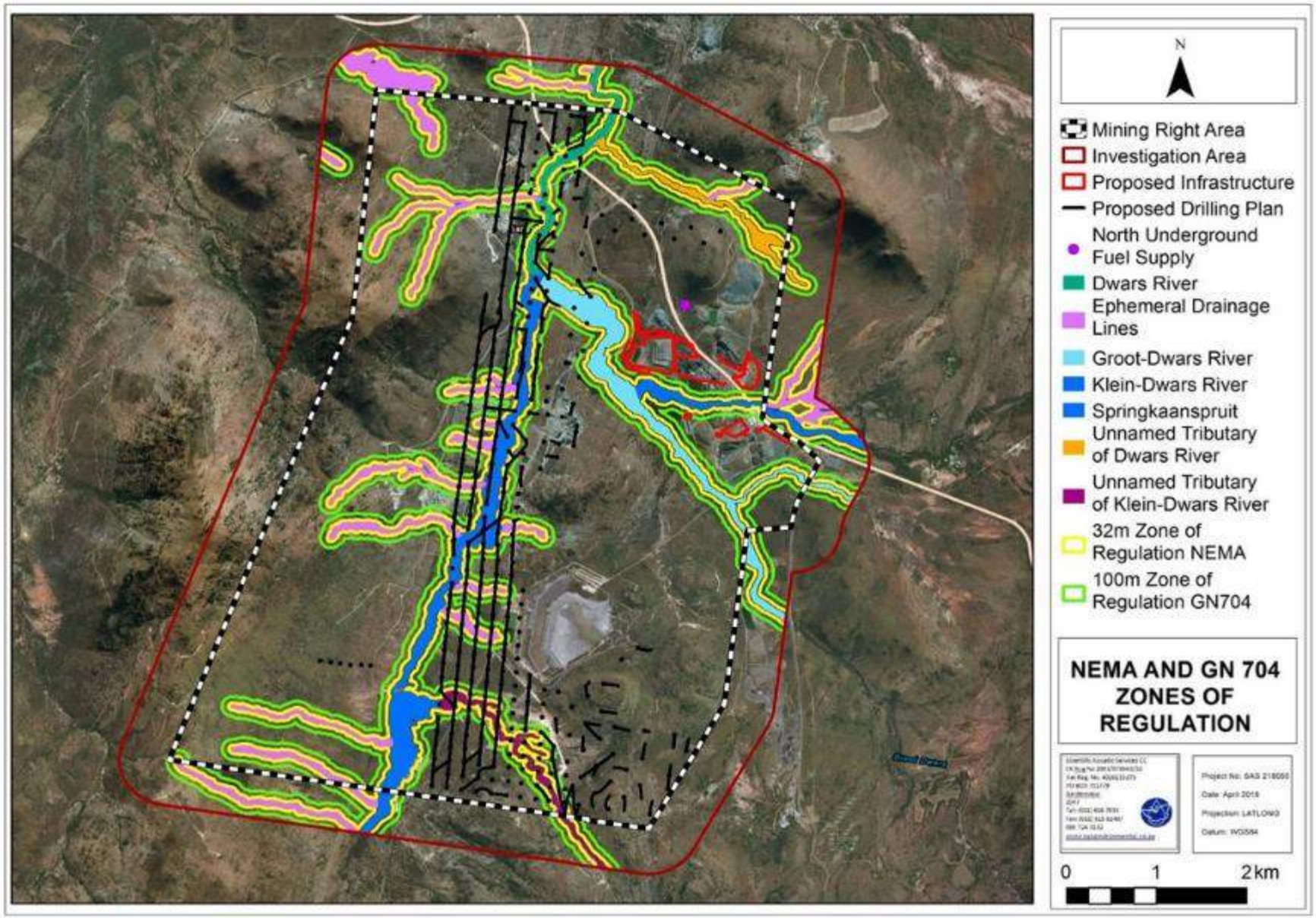


Figure 78: Conceptual presentation of the zones of regulation in terms of NEMA and GN704 in relation to the freshwater resources within the Mining Right Area

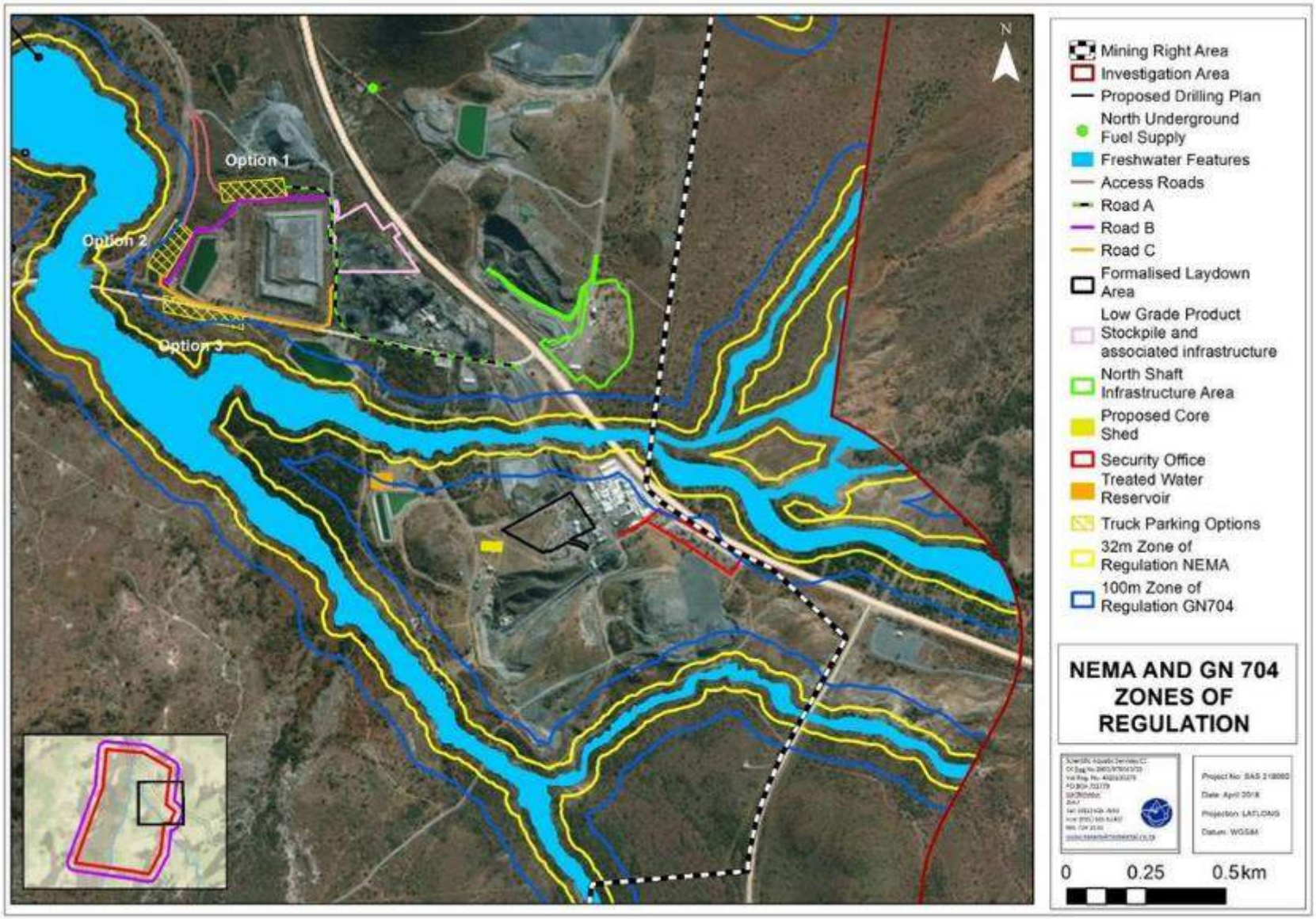


Figure 79: Conceptual presentation of the zones of regulation in terms of NEMA and GN704 in relation to the freshwater resources associated with the proposed capital infrastructure development

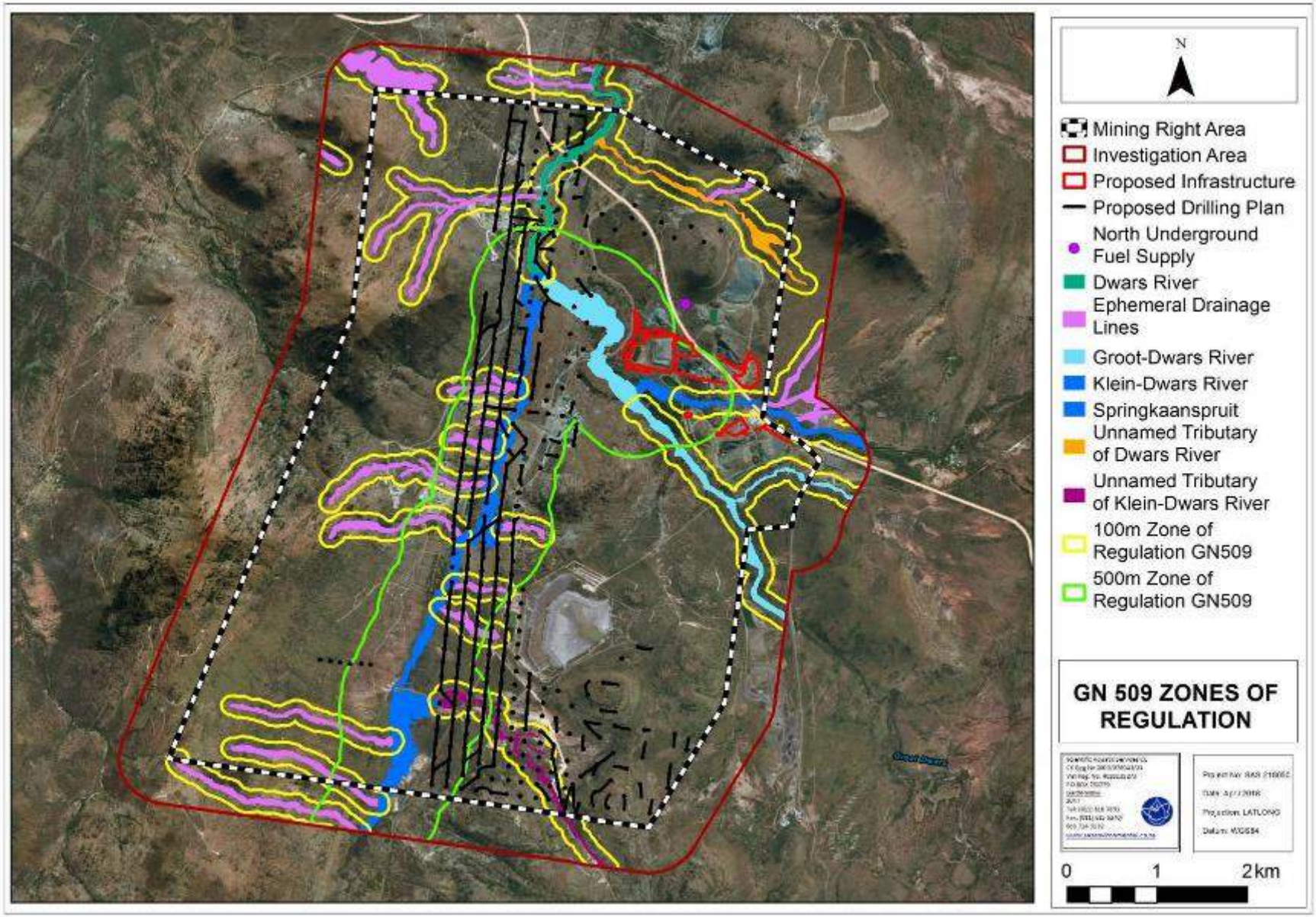
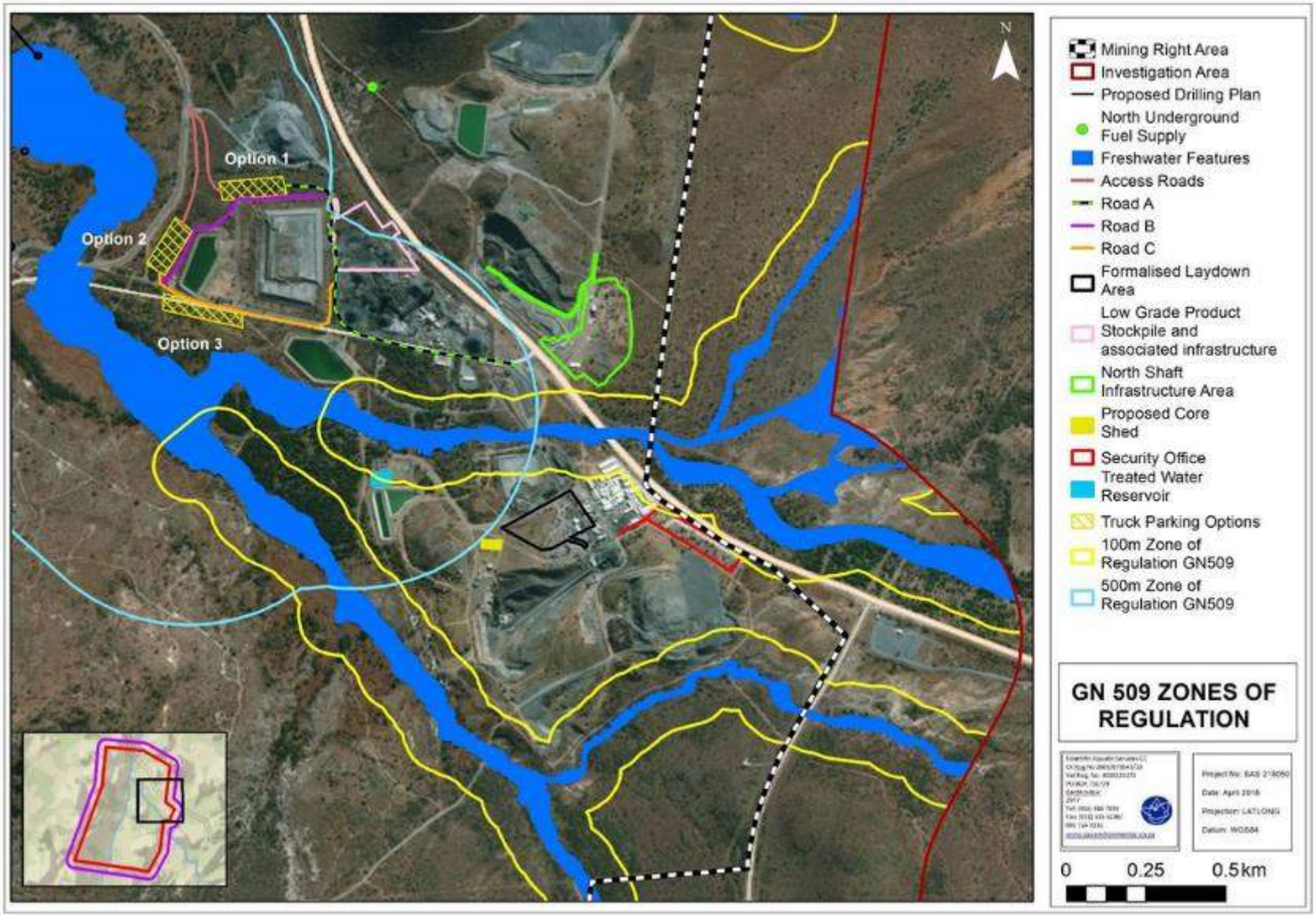


Figure 80: Conceptual presentation of the zones of regulation in terms of GN509 as it relates to the NWA, in relation to the freshwater resources within the Mining Right Area



**Note the 500m buffer indicates where approval from the DWS is required in terms of the location of wetlands. This buffer will not restrict activities, but will require approval from the DWS.*

Figure 81: Conceptual presentation of the zones of regulation in terms of GN509 as it relates to the NWA, in relation to the freshwater resources associated with the proposed capital infrastructure development (for legal applications in terms of the NWA only)

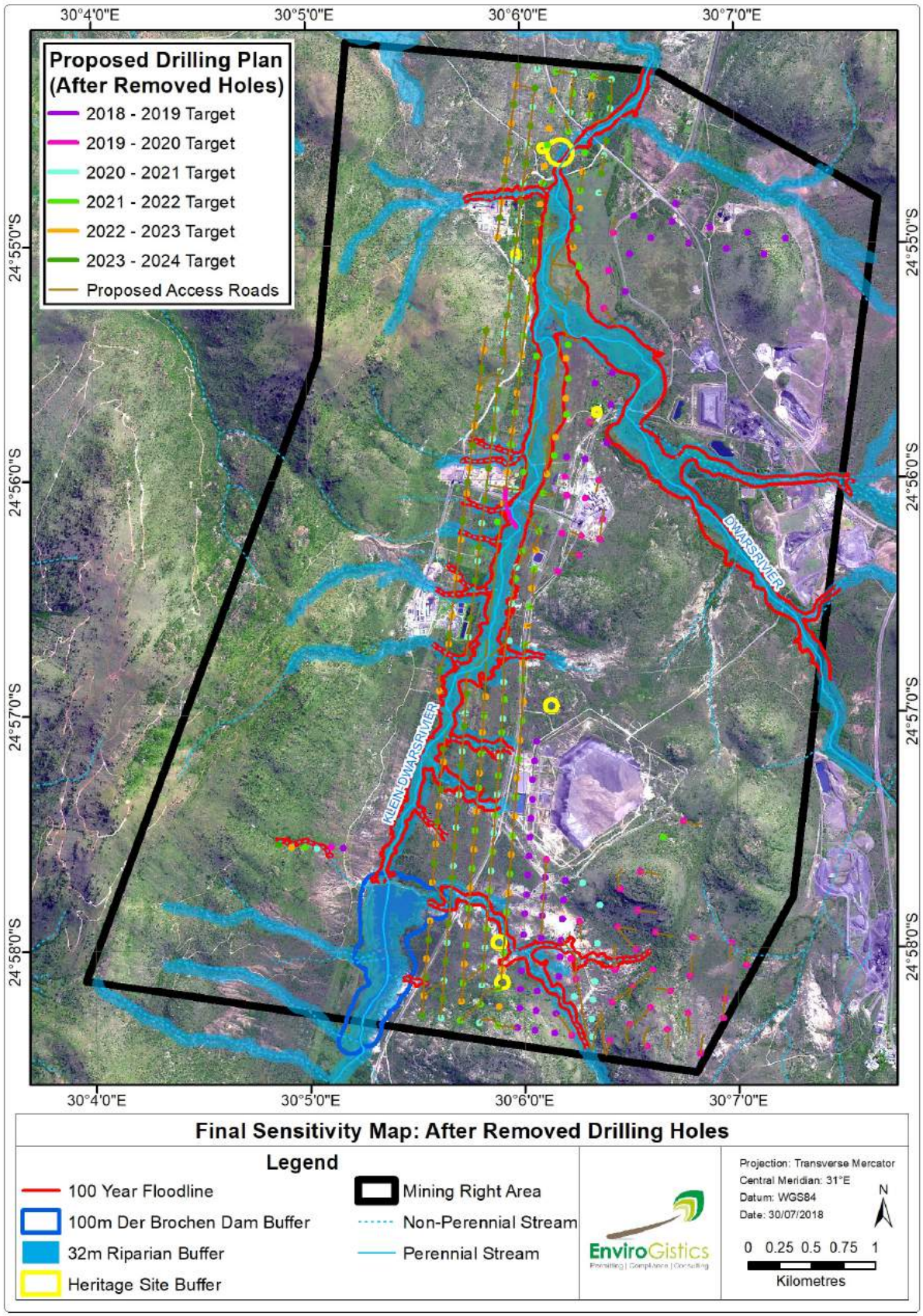


Figure 82: Final Draft Site Map – Exploration Drilling

Please refer to Figure 3 for the location of the Capital Projects.

1.k.iii Summary of the Positive and Negative implication and risk of the proposed activity and identified alternatives

As mentioned before, the demand for chrome has increased globally due to the increase in China Markets. Not allowing the exploration activities will result in a lost opportunity to understand the optimal mining potential within the area, not only based on economic considerations, but also in terms of safe mining considerations.

By not allowing activities such as the Truck Parking Area and the Low Grade Product Stockpile area, will further lead to a restriction on the volume of this material to be produced and dispatched to the required markets. This will result in restricting the mine to market supply available reserves, and could impact on the economics of scale of the mining operation.

The Capital Projects and Fuel and Oil Storage Project are important to the mine to optimise operational logistics within the Mining Right Area, and by not allowing the formalisation and improvement of activities such as proposed at the Security Access area, North Mine Infrastructure and South Mine Laydown area, would result in a lost opportunity for the mine in terms of continuous improvement.

Planning Phase

During the Planning phase, no specific impacts will take place directly, however, poor planning during this phase, could result in significant project delays. This will be due to Environmental Authorisations and other permitting requirements not being in place and/or agreement not in place between all surface landowners where applicable to enable access.

Construction Phase

Logistical Impacts

During the construction phases of the activities, there is the possibility of impacting on the logistical arrangements of adjacent mines, such as Two Rivers Platinum Mine. This is due to the upgrades which will be required on the regional access road, which is also utilised by Two Rivers Platinum for personal transportation and product transportation. The establishment of infrastructure for the exploration activities may also impact on Two Rivers Platinum, as certain proposed drilling sites and exploration activities are located in the vicinity of areas where operational activities of the said mine is being undertaken.

Topography and Soils

The construction of infrastructure and stockpiles will alter the topography by adding features to the landscape which may have a negative impact if not suitably planned to blend into the environment where possible (specifically considering access roads to the exploration drilling sites). Topsoil removal and excavations will alter the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and excavations, and therefore the areas will be bare and susceptible to erosion.

The area is characterised by steep and gradual slopes, consisting of shallow and moderately deep soils respectively. The areas where the infrastructure is proposed are mostly gradual, however some of the exploration activities will be located among the mountainous setting within areas where erosion is considered moderately high. The natural and undisturbed soils will become more vulnerable to erosion once the vegetation is cleared for construction activities, and the soils will inevitably be exposed to wind and some surface runoff during intensive rainfall events.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil may be carried away during runoff if not protected. The cleared areas will be rehabilitated as part of ongoing rehabilitation, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless it is remediated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. There is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil may be stockpiled for rehabilitation without the necessary storm water management systems in place. Soil pollution is therefore possible, but through mitigation it can be minimised or avoided.

The proposed mining and related infrastructure are not anticipated to result in a significant loss of agricultural land capability since the majority of the soils where mining-associated infrastructure is to occur are significantly disturbed and shallow and not suitable for agricultural production. These soils are therefore not considered to contribute to the provincial and national agricultural production grid. It must be noted however that exploration activities will intercept fallow lands which have been previously cultivated. Although some of these areas are comprised of low agricultural potential soils (i.e. Acardia, commonly known as black turf), these soils can still be utilised for Lucerne grass cultivation under extensive management practices. Thus, concurrent rehabilitation within these areas is deemed necessary. The land capability loss is anticipated to range between medium low for Hutton and Bonheim due to the limited extent of these soils, and low for Mispah and Glenrosa as these soils are not considered ideal for cultivation due to their shallow nature and high erosion hazard. It is imperative that the Hutton and Bonheim soils be avoided, if feasible, since these soils arable and present an opportunity for cultivated agricultural production. From a land capability perspective, Witbank (anthrosols) soils have no bearing on agricultural production, and as such the impacts on these soils is anticipated to be low. It is important to note that based on the specialist studies, the Hutton soils will not be disturbed and only 4 drill pads are planned in the Bonheim Soils. It is important that the project team ensure that these soils are also avoided as far as practically possible with the construction of the temporary access roads.

Heavy equipment traffic during construction and exploration activities is anticipated to cause soil compaction. The severity of this impact is anticipated to be medium-high for Rensburg and Acardia soils associated with the Klein Dwarsrivier system due to clayey texture. Whereas soils with a relatively shallow bedrock and lithocutanic character (partly weathered rock material) such as the Glenrosa/Mispah soil forms are anticipated to be less impaired due to the resistance offered by the underlying bedrock.

In general the area is predominantly used for mining and wildlife/wilderness with no active crop cultivation due to soil constraints, attributable to the shallow nature and high clay content of the dominant surrounding soils. As the Mining Right Area is predominantly comprised of low potential agricultural soils, a low impact is foreseen on these soils from a land capability point of view after implantation of mitigation measures during all phases of development. The dominant soils have little bearing on agricultural productivity, with limited contribution to the local, regional, provincial as well as national food production. However, their protection, where feasible is deemed imperative to ensure that the area remains functional post-closure. The impact is anticipated to be very low in areas where soils have been anthropogenically transformed since these soils are not regarded as important for cultivated agricultural production as their structure has been largely destroyed. Thus, these soils could not be assigned to neither arable nor grazing land capability classes.

The surrounding areas within which the proposed mining and related infrastructure is to occur are Witbank soils (anthrosols) dominated by wildlife and wilderness land uses, and no significant cultivated agricultural activities were observed in the vicinity. This is largely attributable to the shallow nature of the surrounding soils. Therefore, the proposed Capital Projects are not anticipated to significantly contribute to the cumulative loss of arable land and herbaceous material for grazing after mitigation measures have been put in place. In addition, since the majority of these proposed activities are to occur on disturbed soils, both physical and chemical latent impacts are anticipated to be relatively low after mitigation measures have been implemented during all phases of development as outlined in this document. It should be noted however that cumulative loss of wilderness soils is likely to occur particularly on sloping areas during drilling and exploration activities, some of which will be unavoidable even when mitigation measures have been implemented. However, the project is not seen as a fatal flaw. Thus, from a soil and land capability point of view, the addition to the cumulative impact footprint of the region is considered relatively minor

Ecology (Flora)

The majority of the project area falls within a CBA 1. These are Irreplaceable areas, which are required to meet biodiversity pattern and/or ecological processes targets; and with no alternative sites available to meet targets and as such any further loss of habitat are likely to compromise the targets of the CBA 1.

<u>Sekhukhune Mountain Bushveld</u>

The Sekhukhune Mountain Bushveld habitat sensitivity is considered high. The clearing of vegetation as part of the drill pads and the access roads will lead to the direct loss of floral species and preferred habitat of floral SCC within these areas. The floral habitat in the Sekhukhune Mountain habitat unit is considered to largely intact, with the majority still in pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

The proposed Capital Project layout areas are unlikely to have a significant impact on floral species in the region as no Sekhukhune Mountain Bushveld habitat unit is present within these proposed areas.

Due to the large extent and the locations of the proposed drill pads and associated roads, habitat for floral SCC will be permanently altered, with special mention of the location of proposed drill pads in the southern and south-eastern sections of the Mining Right Area. Although the footprint areas of the drill pads are small, it will still result in a considerable amount of vegetation being cleared, especially with the construction of roads to gain access to these areas.

Sekhukhune Bushveld

The Sekhukhune Bushveld habitat sensitivity is considered moderately high. The clearing of vegetation as part of the drill pads and access roads will lead to the loss of floral species and preferred habitat of floral SCC within these focus area. Sekhukhune Mountain Bushveld habitat located within the proposed Capital Project expansion areas have already been affected by edge effects of current mining activities and is thus not in pristine condition. The floral habitat in the remainder of Sekhukhune Bushveld habitat unit is considered to be largely intact, with the majority of the area still in a pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

Only Option 3 of the truck parking is considered to be an increased risk to floral SCC. The location of Option 3 will result in the loss of preferred habitat for such species alongside the Groot Dwarsrivier. In this regard, Option 1 is considered preferential, as no habitat connectivity will be lost and will have a lower impact on floral SCC.

Due to the large overall extent and the locations of the proposed drill pads and associated roads, large areas of habitat for floral SCC within these areas will be permanently altered, with special mention of the location of proposed drill pads in the northern, southern and south-eastern sections of the Mining Right Area. Although the footprint areas of the drill pads are small, it will still result in a considerable amount of vegetation being cleared, especially with the additional development of access roads.

Freshwater habitat

The Freshwater habitat sensitivity is considered high. The clearing of vegetation as part of the drill pads and the access roads will lead to the direct loss of floral species and preferred habitat of floral SCC within the focus area with special mention of the drill pads. The floral habitat in the Freshwater habitat unit is considered to largely intact, with the majority area still in pristine condition. Vegetation clearing within this habitat unit will increase the possibility for the proliferation of alien and invasive plant species, which will negatively affect preferred floral habitat.

The Capital Projects, provided they remain outside of any riparian areas and associated buffers, are unlikely to pose a significant threat to freshwater habitat and floral SCC within this habitat.

Old Agricultural Lands

The Old Agricultural Lands habitat sensitivity is considered moderately low. The floral habitat within Old Agricultural Lands habitat unit is considered to be largely disturbed as the area was historically impacted upon by agricultural activities. Vegetation clearing within this habitat unit will lead to further proliferation of alien and invasive plant species.

The Old Agricultural Lands habitat is no longer representative of the CBA 1, but due to natural succession taking floral SCC e.g. *Sclerocarya birrea* subsp. *caffra* have started to re-establish within this habitat unit, and development of drill pads and associated access road in these areas may lead to a loss of protected tree species in these areas.

Transformed habitat

The Transformed Habitat Unit habitat sensitivity is considered low. The floral habitat in the Transformed Habitat Unit habitat unit is considered to be largely disturbed as the area is affected by historic and current mining activities and this habitat is no longer representative of the CBA 1 as a result of historic and current mining activities. Vegetation clearing within this habitat unit may further increase the proliferation of alien and invasive plant species, but the proposed Capital Projects, with the exception of the Truck Parking, located in this area are unlikely to impact on floral diversity, habitat or floral SCC.

Ecology (Fauna)

The proposed Capital Projects are all located within the existing active mining area, and as such, the impacts associated with the various Capital Projects on faunal life are expected to be of low to medium low significance prior to the implementation of mitigation measures. With the cognisant implementation of mitigation measures, these impacts can be minimised to low and very low significance.

The impact significance associated with the drill pads and access roads is notably higher than that of the Capital Projects, as the associated footprints are predominantly located in areas of increased sensitivity and are likely to impact upon several faunal SCC and niche habitats. Prior to the implementation of mitigation measures, the perceived impacts are of medium low to medium high significance for the areas of increased sensitivity, and low to very low in the less sensitive and disturbed habitats, such as the Old Agricultural Lands. With the implementation of mitigation measures as stipulated in this report, the impact significance associated with the sensitive habitats can be decreased to low and medium low significance, whilst the impact significance associated with the less sensitive habitats can be decreased to low and very low significance.

Freshwater and Aquatic Environment

At the time that the impact assessment was undertaken, the layout as provided by the proponent for Project 1, i.e. resource and reserve mapping, which includes the construction of roads, 'drilling pads' and the clearance of vegetation, indicated that several drilling pads would be located within the active channels, delineated floodplains or riparian zones associated with the freshwater resources, as well as within the flood lines applicable to the freshwater resources. Drilling activity within the active channels, delineated floodplains and delineated riparian zones (especially those with steep banks) is likely to have an unacceptably high cumulative impact on the respective systems (and is thus not supported by the specialist).

The previous positioning of some drill pads within the delineated active channels, floodplains and riparian zones associated with the various freshwater resources would have resulted in significant cumulative impacts to soils, vegetation, flow connectivity and overall condition of habitat. For this reason the 1:100 year floodline was included as a no-go zone for the establishment of the drill pads.

Similarly, mitigating impacts of exploratory drilling within the active channel on the instream ecology of these freshwater systems, is not considered to be practical and is unlikely to be financially viable.

At the time of the assessment, the freshwater resources within the Mining Right Area were all considered to be in a largely natural to largely modified ecological state, depending on indices applied and sites assessed, and of high ecological importance and sensitivity.

Due to the topography of the area, it is possible that the some of the Capital Project development expansion activities in the east, with specific mention of the proposed truck parking area and the treated water reservoir, may impact indirectly on the Groot Dwarsrivier and Springkaanspruit respectively, as they are located downgradient of the proposed activities. However, the distance of the activities from these watercourses will have an influence on the severity of perceived impacts and it is considered unlikely that these activities will have any significant impact.

Rehabilitation opportunities of drainage systems within the Mining Right Area are considered limited, taking into account the severity of the impact in some areas (e.g. instream impacts associated with drilling within the active channels of rivers) and the cumulative impact of previously authorised and planned future mining activities within the catchment. The efficiency with which rehabilitation can be implemented on such a large scale is debatable, and due to the complexity of the freshwater resource rehabilitation process and reinstating hydrological functioning in an area, as well as the risk of contamination of water within the hydrological system that has been reinstated, rehabilitation is not deemed an appropriate mitigation strategy for most of the freshwater resources within the Mining Right Area.

The various drainage systems within the Mining Right Area, are deemed to be in largely natural to moderately modified ecological condition and are considered of very high to moderate Ecological Importance and Sensitivity (EIS). These drainage systems are considered important for biodiversity maintenance as well as contributing to the ecological functioning of downstream systems such as the Dwars River and the Steelpoort River. Whilst the perceived impact significance of some of the proposed expansion activities which this study focuses on (such as the development of additional surface infrastructure) may not necessarily have unacceptably high impacts on the freshwater ecology of the Dwarsrivier Mine, it is important to note that cumulative impacts associated with previously authorised activities (and potential future activities), both within the Dwarsrivier Mine project areas and within the greater catchment of the primary drainage systems (i.e. the Groot Dwars, Klein Dwars and Dwars Rivers) may lead to very high impacts on the freshwater ecology of the region. Therefore, as much as feasible (whilst allowing for the optimal extraction of valuable ore), impacts on and deterioration of the ecological integrity the freshwater resources associated with the Dwarsrivier Mine project area must be minimised as much as practicably possible. Central to this is ensuring that very careful planning of infrastructure layouts and positioning takes place, so as to prevent (ideally) or minimise direct encroachment on freshwater resources. This is particularly pertinent to the planned exploration (drilling) activities. The location of the various freshwater resources within the project area (and 500m thereof) are provided in Section 1.k.ii.1.a.2, along with maps

indicating the applicable zones of regulation around these resources in terms of NEMA, GN704 and GN509 of the NWA, and these should be taken into account during the planning and subsequent phases of the mine. Nevertheless, should the proposed project be approved, very strict adherence to cogent, well-developed mitigation measures must take place in order to minimise and prevent potential impacts on the freshwater resources arising from the proposed activities (particularly the drilling and exploration activities), as well as to minimise the impact significance of cumulative impacts in future.

In addition to the above, although it does not form part of the Scope of Work for this study, it was noted by the specialist that the proponent intends to under-mine the Groot Dwarsrivier in future, although details pertaining to the exact location and intended methods were not available at the time of this assessment. However, according to the EAP (Pers. Comm. T. Bekker, 2018), the depth of mining will be greater than 300m. Thus, the risk of dewatering of the Groot Dwarsrivier is negligible and was therefore not assessed (please refer to the impacts considered by the Hydrogeological Study presented in Section 1.j.

Water

Any excavations and activities within a drainage lines/watercourse may impact on the surface water environment by altering the physical characteristics of such features, this also refers to exploration activities proposed in the flood lines of non-perennial drainage lines. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation. Temporary water crossing may be required for the exploration activities access roads, if this is not properly manged it could have an impact on the watercourses and draining lines. Due to the sensitivity of the environment in the region (CBAs), a high level of mitigation, comprising of avoidance, minimisation and rehabilitation will be required during all phases of the proposed project to ensure that the ecological integrity of the freshwater resources and ecological characteristics in the vicinity of mining activities are not compromised.

Groundwater

- Intersection of groundwater during exploration drilling

The groundwater table will be intersected during exploration drilling. The existing dataset confirms that the average depth to groundwater is 7,5m. Due to the fact that biodegradable drilling fluids will be used, groundwater contamination associated with exploration drilling is not expected to be significant.

Exploration drilling must not take place on the alluvial aquifer. This aquifer is vulnerable to surface sources of contamination, like oil and diesel spills due to its shallow depth and high permeabilities. Contamination of this aquifer will result in adverse and most probably irreversible impacts on groundwater as well as the Dwarsrivier and Groot Dwarsrivier.

No groundwater will be abstracted during the drilling programme. Water required will be trucked in. For this reason, exploration drilling will not cause a lowering in groundwater levels nor compete with existing groundwater abstraction.

Road construction is not expected to significantly impact on groundwater availability or quality, provided that oil and diesel spills do not occur.

The impact of exploration drilling on groundwater quality and availability is not considered significant due to the limited extent and short duration of activities at each drill pad.

In terms of the discard rock usage in road construction, etc. only the Old TSF and additional discard material sample meet the criteria to be classified as a Type 3 waste. The other five samples have LC values below the LCT0 threshold value. However, due to the fact that the TC values for all samples exceed the TCT0 values for the elements listed above, the waste cannot be classified as Type 4 in terms of the Waste Regulations.

Based on the outcomes of the study it is recommended that the Discard Storage Facility be considered for the use in road construction, etc. and there is no LC limits triggered.

- Oil and diesel spills

Uncontained and unmanaged oil and diesel spills associated with infrastructure development will result in contamination of the underlying aquifers. The shallow weathered and alluvial aquifers are especially vulnerable to groundwater contamination.

- Use of discard rock for the construction of roads and the truck stop

The mine proposes to use discard rock for road and truck parking construction. Recent leach tests on the discard rock material indicate that the majority of leachable elements were below the laboratory detection limits. As

such, the use of the rock as fill material is not expected to impact significantly on groundwater quality. This preliminary impact assessment *will be confirmed during the more detailed groundwater study that is currently underway*.

A preliminary assessment is therefore that the use of discard rock for fill during road and truck parking construction will most probably result in an insignificant impact on groundwater water quality during the operational phase of mining and post-closure.

- Under-mining of rivers and streams

Available information suggests that rivers and streams will be under-mined, if the outcome of the proposed exploration programme is positive and underground mining is expanded. A mine plan is not available at present as this will be dependent on the exploration programme outcomes, but is estimated that the depth of mining would be around 300m below surface.

The results of impact assessments undertaken for the existing underground mining activities (iLEH, 2015) suggests that the most significant impact on the upper weathered and alluvial aquifers is a result of groundwater abstraction for water supply to the mine and not from underground dewatering. The mine is in the process of reducing its dependence on groundwater abstraction from the alluvial aquifer. This water will be partially replaced by water from the Water Treatment Plant. Simulations undertaken as part of the 2015 indicate that the impact of underground dewatering is not uniform across the mining area. In areas of shallower under-mining, groundwater levels in the upper weathered and alluvial aquifers may be lowered by 3 – 4m as a result of underground mine dewatering. In these areas, a reduction in the groundwater component to stream base flow was estimated to be between 18 and 98m^3/d, depending on the depth and extent of mining.

Based on the current understanding of the interaction between the shallow weathered and alluvial aquifers and the underground workings, it is unlikely that mining at depths of 300m and deeper would significantly impact on the overlying rivers and streams. If the groundwater component to stream base flow is to be reduced as a result of mining at these mining depths, the reduction will probably be closer to the lower range reported above, around 20m^3/d. *This assessment will be confirmed upon completion of the detailed groundwater study that is currently underway.*

A preliminary assessment is therefore presented that the undermining of rivers and streams will most probably not result in a significant impact over the life of the operations. Post-closure, groundwater levels will recover and residual impacts will reduce with time, most probably within 30 – 80 years of the completion of mining.

Heritage

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Large portions of the project area are characterised by existing mining operations that would have impacted on surface indicators of heritage sites and apart from isolated widely scattered MSA artefacts (of low significance), no archaeological sites of significance were recorded during the survey for the Capital Projects and Diesel Storage. In terms of the exploration programme, two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50-meter buffer zone around the sites.

In terms of the built environment of the area (Section 34 of the NRHA), no standing structures older than 60 years occur within the impact areas for the Capital Projects and Diesel Storage (including decommissioning of existing facilities). Several buildings were however identified from the desktop study close to drill pads and should be avoided with a 30-meter buffer zone. In terms of Section 36 of the NHRA, several burial sites are known to exist in the larger project area. However no burial sites are on record for the areas of impact. If any graves are located in future they should ideally be preserved *in situ* or alternatively relocated according to existing legislation. The area is extensively mined and the proposed project is in line with the current land use and will not impact negatively on significant cultural landscapes or viewscapes. During the public participation process conducted for the project no heritage concerns were raised.

The project area is indicated as being of low to insignificant palaeontological sensitivity on the SAHRA palaeontological map. This is corroborated by a paleontological study (Rossouw 2017) that found that the Dwarsrivier Mine area is underlain by paleontologically insignificant intrusive igneous rocks and there is little chance of finding fossil material. The well-known geological monument referred to as the “Dwarsrivier National Monument” is located close to some of the drill pads and will have to be preserved with a buffer zone of 100 meters. No further mitigation prior to construction is recommended in terms of the archaeological and paleontological components of Section 35 for the proposed development to proceed.

Operational Phase

During the operational stages of the mining operation, groundwater may be directly affected if any oil and fuel spillages occur during these scenarios and activities. Similarly, hazardous surface spillages may seep into the underlying aquifers and contaminate ground water if not properly controlled and managed. Improper handling of hazardous material may cause contamination of nearby surface water resources (watercourses) during runoff episodes, if storm water management measures are not implemented. Lack of storm control structures could lead to erosion of topsoil stockpiles during heavy rains and runoff could carry suspended solids into the downstream environment.

During the operation, the abovementioned activities (stockpiling of product and presence of drilling rigs in the area) have the potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations, but is not considered significant due to the type of activities planned. The operation will typically contribute low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary roads and existing mining activities. The proposed operation will add a certain amount of noise to the existing noise in the area, but on a limited scale.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be low with the implementation of the management measures. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users. However, the addition of the truck parking area will have an overall positive impact on the road network, by avoiding the parking of the trucks on the main Sekhukhune Road.

The operation will not create new employment opportunities as the activities planned mainly involve the upgrade of existing activities, and the improvement of logistics in and around the mine. The exploration activities are undertaken to ensure a long term mining plan, which will rather result in long term employment of current staff that necessarily creating new employment opportunities.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end at mine closure, reducing the monetary income of individuals and operation-related businesses.

With any activity where invasive tasks will take place, such as site clearance and constructions, negative environmental impacts may arise. As part of the proposed projects, various impacts have been identified in Table 51 to Table 54. It is however clear from these tables that with the correct management measures in place these impacts could be managed successfully.

Decommissioning

The decommissioning activities are similar to what can be expected in the construction of the sites. However even with extensive mitigation, latent impacts on the receiving environment are deemed highly likely, specifically in terms of the ecological impacts.

The following key positive impacts are foreseen:

- The lawful construction of the activities will allow the mine to operate within the legal realm of the Environmental Legislation;
- The exploration activities will allow to the mine to understand the underground resources and therefore plan the mining operations to mine the resource optimally, which is a legal requirement in terms of the MPRDA;
- Understanding the underground resources and mining optimally may result in a longer life of mine, which will fulfil the economic requirements of the municipal IDP, as well as allow for long term employment;
- The expansion of the Product Stockpiles will allow the mine to optimally supply to market demands;
- The development of an additional receiving Truck Parking will solve logistical constraints currently experienced with the current Truck Parking and trucks having to part on the regional roads. This project will not only allow efficient internal operations within the mine, but will also improve safety on the roads;
- The upgrade of the various activities will ensure that the mining environment is safe and well designed to optimise the mining operations;

- The diesel storage area decommissioning and reconstruction will allow the mine to make use of a trusted service supplier, and the project will further ensure that all diesel bunds and infrastructure are designed based on the latest acceptable standards. Sustainable supply of fuels to the underground operations on the Northern Mine will also be possible with the approval of this project; and
- 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.
- With any activity where invasive tasks will take place, such as site clearance and construction, negative impacts may arise. As part of the proposed projects, various potential impacts have been identified in Table 51 to Table 54.

Based on the outcomes of the specialist studies, and the incorporation of the management measures, the initial site layout has been amended to avoid the sensitive zones. No fatal flaws have therefore been triggered by the proposed activities, and where concerns were raised by the specialists (i.e. hydrology and aquatic specialist), these have been incorporated into the final layout to exclude these concerns.

It is key to note that the outcomes of this EIA in terms of the location of the drilling pads, are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensure that the exploration drilling is undertaken to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

1.l Proposed Impact Management Objectives and the Impact Management Outcomes for inclusion in the EMPr

The following objectives must be aimed upon in order to achieve the impact management outcomes:

Planning Phase

The following aspects with its associated objectives have been considered during the planning phase:

- Legal Planning
  - To operate within the enviro-legal ambits of South Africa; and
  - To be aware of the latest environmental legal requirements.
- Integrated Mine Development Planning
  - Comply with the DWS Best Practice Guidelines;
  - Comply with the requirements of the approved EMPr and Environmental Authorisation;
  - Ensure that all relevant departments (Geology, Production, Engineering and SHEQ) are aware of the conditions and requirements of the EMP and Environmental Authorisation; and
  - Ensure that a communication forum and integrated meetings are in place between the above-mentioned departments, to ensure that environmental requirements are identified proactively to ensure optimal, timeous and lawful mining activities can be undertaken.
- Stakeholder Consultation and Economic Development:
  - Ensure that the activities of surrounding mines are not negatively impacted upon as a result of the proposed projects.

Construction Phase:

- Ensure that the areas defined as sensitive are protected and that the final site layout as proposed are adhered to (see Section 1.k.ii);
- Only commence with construction when all required environmental and water permits/license have been obtained.
- Reduce site clearance activities as far as practically possible;
- Comply with the DWS Best Practice Guidelines;
- Remain within the ambits of the approved mining layout and activity description of the approved EMPr and Environmental Authorisation;
- Comply with the requirements of the approved EMPr and Environmental Authorisation;
- Ensure that all relevant departments (Geology, Production, Engineering and Safety, Health, Environment and Quality (SHEQ)) are aware of the conditions and requirements of the EMPr and Environmental Authorisation;
- Ensure that all relevant departments are aware of the enviro-legal requirements pertaining to mining operations to ensure prudent mine planning;

- Ensure that a communication forum and integrated meetings are in place between the above-mentioned departments, to ensure that environmental requirements are identified proactively to ensure optimal, timeous and lawful mining activities can be undertaken;
- Ongoing optimisation of Water Demand and Conservation on site;
- Maintain and open and transparent relationship with the regulatory authorities;
- Prohibit unauthorised access to site and/or designated mining area without the necessary induction; and
- Induction to be updated and in line with all enviro-legal regulatory requirements.

Operational Phase

- Operation of all mining infrastructure and activities
- Environmental Objectives
    - Financial provision for post closure maintenance cost of rehabilitation activity area/sites will at all times be appropriate to provide for premature closure in terms of the MPRDA;
    - Annual Rehabilitation Plans will be developed and implemented on site;
    - Remain within the ambits of the approved mining layout and activity description of the approved EMPr and Environmental Authorisation;
    - Operate facilities towards and/or within a practical design with closure in mind;
    - Operate the water management circuit on site to increase efficiency and reduce the need for maintenance of these facilities;
    - Soils and land capability:
        - Protect soil resources and surrounding land capability; and
        - Limit the occurrence of erosion on site.
    - Ecology:
        - Limit the presence of alien and invasive species on site;
        - Limit the impact of the facility on the ecological setting of the area; and
        - Limit access of fauna and avifauna to the area.
    - Protect soil resources and surrounding land capability;
    - Aquatic Environment:
        - Protect the groundwater and surface water resources;
        - Protect the integrity of the Storm Water Management System; and
        - Meet and operate within published environmental guidelines, such as ambient air quality guidelines, water quality guidelines and biodiversity plans.
- Hydrocarbon Management
    - Ensure that vehicles are maintained and in good working condition;
    - Ensure that workshops are designed to accommodate the maintenance and servicing of mine vehicles within contained footprints;
    - Ensure that the mine operates within a defined clean and dirty water system;
    - Ensure that the necessary oil separation system and catchment areas are in place and maintained;
    - To ensure that all hydrocarbons are stored in a manner which will prevent any harm to the environment;
    - To prevent spillages of hydrocarbons;
    - To capture, contain and manage any spillage;
    - To ensure that any area which has been affected by a hydrocarbon spill is suitably rehabilitated and monitored until rehabilitation efforts have been successful; and
    - Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.
- Handing and Storing of Waste
    - The hierarchy of waste management should be implemented on site, in line with the NEM:WA;
    - Ensure that storage takes place in such a manner as not to cause any pollution to the environment;
    - All wastes (hazardous and domestic) to be disposed of at licensed facilities;
    - The cradle to grave principle must be implemented;
    - No hazardous waste (including Mine Residue Stockpiles as defined as such) may be removed from site, without the necessary approval from the regulatory authorities;
    - Ensure that temporary storage facilities comply with best practice guidelines;
    - Prevent any pollution of water resources by ensuring that an effective surface runoff control system is in place;

- Prevent, contain and clean up any spillages; and
- Ensure that all facilities are monitored and maintained on a regular basis.

- Ongoing Research
  - The NEMA Regulations promulgated to regulate the Financial Provision has resulted in mining operations having to reconsider the implementation of ongoing rehabilitation into the operational plans of the mine. Ongoing research into rehabilitation at the Beeshoek Mine will involve the following:
  - Undertaking of an Impact Prediction Model as part of the Groundwater model to determine any changes in the 2006 EMPr assessments in terms of the impact of Mine Residue Deposits on the groundwater resources, if any;
  - Strategic plan on how the mine can more efficiently mine resources optimally by ongoing exploration activities.
  - Development of a Water Conservation and Demand Management Plan and the annual update thereof.
  - To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties

The following relates to site specific objectives:

- Exploration and Access Roads
  - Ensure that the Two Rivers Platinum Mine EMPr is considered when construction and rehabilitation activities are being undertaken on Two Rivers Platinum Mine surface rights;
  - Utilise existing roads as far as practically possible;
  - Construct new roads with the least environmental disturbance and vegetation clearance; and
  - Utilise existing roads as far as practically possible, and where access roads are required, ensure that roads are constructed with end land use objectives in mind – i.e. follow natural contours.
- Exploration Sites
  - Exploration drilling must be undertaken by a reputable company and each exploration borehole site must be adequately supervised by a Dwarsrivier Mine representative.
  - All personnel involved in the exploration programme must receive adequate training regarding the groundwater management programme, Spill Procedure, use of oil spill kits and rehabilitation of exploration boreholes before work commences.
  - The area to be disturbed must be kept to a minimum, not exceeding 20m x 20 m.
  - Exploration/ drilling pads must be located outside of the sensitive buffer zones and where possible existing roads must be utilised;
  - Exploration drilling must not take place on the alluvial aquifer, as it is vulnerable to surface sources of contamination;
  - Ensure that only temporary infrastructure are utilised;
  - A drip tray or similar containment measure must be placed underneath the drilling rig to contain oil and diesel spills;
  - Only biodegradable drilling fluid must be used during exploration drilling;
  - A chemical toilet must be used on site during exploration drilling;
  - Full or leaking toilets must be reported to the Supervisor for corrective action or replacement;
  - Sediment and erosion controls must be designed to contain possible dirty runoff within the drilling pad. This will be achieved with the portable bunding that will be installed around each drilling pad;
  - Spills must be managed according to a formalised Spill Procedure. Any contaminated soil must be collected into non-permeable bags and disposed of to an approved disposal facility;
  - For the purpose of future monitoring programmes, impact assessments and rehabilitation, the depth of water strikes must be recorded during exploration drilling;
  - The static groundwater level must be monitored in each exploration borehole after completion and before rehabilitation for future monitoring, impact assessment and rehabilitation purposes;
  - All boreholes must be sealed upon completion to prevent ingress of water from surface;
  - Any completed borehole that is not required for groundwater monitoring, must be sealed and rehabilitated to prevent groundwater contamination;
  - Rehabilitation of exploration boreholes as well as the site and temporary access roads must be undertaken upon completion of drilling at each position;
  - Immediately rehabilitate an exploration drilling pad once studies have been completed (concurrent rehabilitation to take place in these areas);

- Retain as many boreholes for monitoring purposes in the future – cap these boreholes;
- Refrain from exploration activities within the flood line of the Dwarsrivier if not specifically required for future safety considerations; and
- Ensure that exploration sites are placed not to impact on Two Rivers Platinum mining operations.

- Metallurgical low-grade stockpile
  - All runoff from the site must be contained and diverted to the Upper RWD. No surface runoff may escape into the catchment in an uncontrolled manner; and
  - Groundwater monitoring in the existing monitoring boreholes must continue according to the conditions of the approved WULs, especially in borehole DRM4 situated near the Plant.
- Other infrastructure and Diesel Storage
  - The diesel storage and transfer system to be installed at North Shaft for use underground, must be constructed according to prescribed standards. This includes containment, dispensing and transferring facilities;
  - All personnel working with diesel containment, dispensing and transferring equipment and facilities must receive adequate training regarding the requirements of the Spill Procedure, the use of spill kits and the disposal of contaminated material;
  - Daily inspections must be undertaken at all diesel and oil storage, dispensing and transferring facilities to identify leaks and spills efficiently. Should leaks be detected, these must be contained and cleaned up as a matter of urgency. Contaminated soil must be disposed of to a licensed facility;
  - Regular inspections must be undertaken at the new change house to monitor for leaks. Should leaks be detected, these should be reported and fixed as a matter of urgency;
  - Sewage generated at the new change house must be contained and treated to avoid groundwater contamination. It is noted that Dwarsrivier Mine have several sewage plants on site that can be used for this purpose, if a dedicated sewage plant will not be constructed at North Shaft; and
  - The containment of water from the WTP in a reservoir is not expected to impact on groundwater quality.
- Truck Parking Area
  - To only accommodate trucks which fulfils Environmental and Safety Standards;
  - No parking along the regional roads;
  - Ensure that logistics in terms of road usage are undertaken and scheduled in a manner as not to impact on Two Rivers Platinum mining operations;
  - The supervisor of this area must receive adequate training regarding the groundwater management programme, Spill Procedure and the use of oil spill kits;
  - No maintenance of trucks will be allowed in this area. All maintenance must be undertaken at the workshops; and
  - If oil and/or diesel leaks are identified, these must be reported and cleaned up as a matter of priority.

<u>Rehabilitation objectives:</u>

- Demolish all haul and access roads;
  - Rip and scarify all roads that have been compacted;
  - Encourage plant growth and natural seeding in order to revegetate disturbed areas;
  - Return areas back to natural vegetation state (restore land for potential grazing purposes); and
  - Manually plant and re-vegetate with indigenous flora only when self-seeding is not successful.
- Surface Footprints
  - Loosen soil;
  - Aid germination of seeds and encourage roots to take hold;
  - Topsoil to a minimum depth of 300mm (30cm); and
  - Re-vegetate using flora indigenous and endemic to the Dwarsrivier/Sekhukhune area.
- Buildings and Infrastructure
  - Dismantle mine related infrastructure;
  - Demolish all concrete, brick and/or gravel foundations, slabs, pavements, roadways;
  - Dismantle all fencing for recycling or metal scrapping;
  - Remove all fuel storage facilities (tanks, reticulation et) and have them removed by an accredited fuel handling company; and

- The foundations of all buildings that will be removed should be removed to a depth of 1m.

- Building on the closure vision, the objectives of the final rehabilitation plan are to:
  - Ensure all areas are closed in a manner that ensures they are geotechnically stable and safe;
  - Prevent erosion through sloping of remaining deposits to appropriate gradients;
  - Ensure that all areas are free-draining and non-polluting;
  - Establish vegetation cover allowing the area to be used for wilderness;
  - Establish a low maintenance system; and
  - Ensure the final landform blends into the surrounding topography.

1.m Final Proposed Alternatives

Please refer to section 1.g for the alternatives considered. Consideration of alternatives resulted in the following:

- Exploration activities will remain outside of the 1:100 year flood lines, with only essential roads constructed on a temporary nature within flood lines;
- Truck Parking Option 1 has been opted for, based on the ecological, aquatic, hydrological and heritage assessments; and
- The discharge of fissure water has been excluded from this project, pending further in-depth specialist investigations.

1.n Aspects for inclusion as conditions of the Environmental Authorisation

This EMPr has been complied to present all the required management measures, actions, monitoring requirements and closure objectives to ensure that the impact of this project be limited to meet the final objectives listed in this document.

The following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- The management measures and actions as presented in the EMPr must be implemented and adhered to on site;
- An ECO should be appointed during the construction phases to monitor the implementation of the EMP;
- The Monitoring Programme and Reporting Programme (internal and external audits) should be adhered to;
- Ensure that the activities are planned in line with the no-go zones indicated in this document and by the specialist studies – see Section 1.k.ii;
- Ensure that the no-go zones are clearly defined and indicated on the surface layouts and design plans;
- Ensure that all design drawings include effective erosion control measures;
- Adhere to the proposed conceptual Storm Water Management Plan contained in the Hydrological Report and also stipulated in Section 1.g.v.5;
- Adhere to the construction requirements as stipulated in the Freshwater and Aquatic Assessment, in the event that drainage lines require temporary crossings – see Section 1.g.v.5;
- Ensure that training on the EIA and EMPr and the final decision by the DMR is given to all contractors and employees directly involved in the planning, construction and operation of the projects in question;
- Adhere to all management measure and actions presented in this report;
- Demarcate all sensitive and/or listed flora species prior to site clearance and apply for the necessary tree and vegetation removal permits with relevant Departments (LDEDET and DAFF);
- No activities which requires WULs or approval from the DWS may commence without the necessary authorisations; and
- The rehabilitation of activities on the Two Rivers Platinum Mine surface rights should be undertaken in consultation with the landowner and signoff upon completion should be obtained from the landowner to indicate agreement with the rehabilitation outcomes; and
- 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 revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.

1.o Description of any Assumptions, Uncertainties and Gaps in Knowledge

In each of the specialist reports contained in Annexure 6, the relevant assumptions and gaps have been listed. None of the assumptions listed resulted in uncertainty in terms of the outcomes of the specialist studies and therefore the EAP is confident that the management measures presented in this report will be suitable for achieving the environmental objectives.

The drilling plan as presented in this report is not 100% fixed, neither are the temporary access roads, which cannot be delineated at this time as a result. However, the drilling plan will be restricted to the area of study and will remain outside of the buffers as presented in 1.k.ii.

There will always be the possibility of chance heritage findings and for this reason a procedure for such an incident has been included into the management measures.

It is key to note that the outcomes of the location recommendation of the drilling pads of this EIA are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensure that the exploration drilling is undertaken to ensure non-negotiable safety standards in future mining development and where this results in encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.

The final groundwater study will be included into the final EIA Report.

1.p Reasoned opinion as to whether the proposed activity should or should not be authorised

1.p.i Reasons why the activity should be authorised or not

It is the opinion of the EAP that this EIA and EMP provides the necessary and relevant information required in order to implement the principles of Integrated Environmental Management so as to ensure that the best long-term use of the soil, ecological and aquatic resources in the project area will be made in support of the principle of sustainable development. Recommendations of the EAP and specialists have been considered favourably by the applicant and the final project plan has incorporated these recommendations. If the proposed management and mitigation measures are not properly applied or if the applicant intentionally disregards any of these measures, it will negatively affect the environment and have potential consequences and for this reason it is important that the recommendations for conditions for inclusion as presented in Section 1.p.ii.1 be included should the Environmental Authorisation be considered favourably by the Competent Authority.

No fatal flaws based on the final layout have been identified.

It is recommended that, the proposed development be considered **favourably** provided that the recommended management measures for the identified impacts, monitoring requirements and auditing protocols are adhered to, and that construction within the no-go zones is avoided. Where this is not possible, such as avoiding the 500m buffer around wetlands systems, such construction is to be kept to an absolute minimum and only undertaken with the necessary approval of the DMR and DWS.

1.p.ii Conditions that must be included in the authorisation

1.p.ii.1 Specific conditions to be included into the compilation and approval of the EMPr

As presented before the following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- The management measures and actions as presented in the EMPr must be implemented and adhered to on site;
- An ECO should be appointed during the construction phases to monitor the implementation of the EMP;
- The Monitoring Programme and Reporting Programme (internal and external audits) should be adhered to;
- Ensure that the activities are planned in line with the no-go zones indicated in this document and by the specialist studies – see Section 1.k.ii;

- Ensure that the no-go zones are clearly defined and indicated on the surface layouts and design plans;
- Ensure that all design drawings include effective erosion control measures;
- Adhere to the proposed conceptual Storm Water Management Plan contained in the Hydrological Report and also stipulated in Section 1.g.v.5.
- Adhere to the construction requirements as stipulated in the Freshwater and Aquatic Assessment, in the event that drainage lines require temporary crossings – see Section 1.g.v.5;
- Ensure that training on the EIA and EMP and the final decision by the DMR is given to all contractors and employees directly involved in the planning, construction and operation of the projects in question;
- Adhere to all management measure and actions presented in this report;
- Demarcate all sensitive and/or listed flora species prior to site clearance and apply for the necessary tree and vegetation removal permits;
- No activities which requires WULs or approval from the DWS may commence without the necessary authorisations; and
- The rehabilitation of activities on the Two Rivers Platinum Mine surface rights should be undertaken in consultation with the landowner and signoff upon completion should be obtained from the landowner to indicate agreement with the rehabilitation outcomes.

1.p.ii.2 Rehabilitation requirements

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Specific objectives associated with this application include:

Rehabilitation of infrastructure areas (Laydown Area infrastructure, Security Buildings, Treater Water Reservoir, North Mine infrastructure and Exploration Pads)

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

- Infrastructure such as the offices, administration buildings and stores should be removed, unless legally transferred or sold to another party;
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate;
- If complete infrastructure removal is chosen, all infrastructure should be demolished to 1m below surface and the demolition rubble removed and taken to the nearest waste facility, or as per the approved EMPr (December 2010), all rubble that is created by the demolition of the area must be disposed of in the open mining pit. The transport of the rubble and discard materials should be done in a cost effective way;
- If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;
- Rip disturbed areas to alleviate compaction;
- Monitor and maintain vegetation establishment;
- Remove alien invasive vegetation;
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion;
- Any surface water management infrastructure will be maintained to ensure they are stable and functional; and
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Rehabilitation of Roads and Linear Infrastructure (Conveyors, Exploration Roads, Truck Parking, Access Roads)

- The weighbridge at the Truck Parking Area will involve the removal of supporting foundations and other associated infrastructure;
- Roads should be rehabilitated as per the management measures, unless legally transferred or sold to another party;
- Mine roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed;
- Removal of all signage, fencing, shade structures, traffic barriers, etc.;
- All 'hard top' surfaces to be ripped and bitumen/concrete removed along with any culverts and concrete structures;

- All concrete lined drainage channels and sumps will be demolished and removed;
- All potentially contaminated soils are to be identified and should be removed and remediated;
- All haul roads that have been treated with saline dust suppression water need to be treated as "sealed" roads with the upper surface ripped and removed to designated contaminant disposal areas;
- All power and water services to be disconnected and certified as safe prior to commencement of any demolition works;
- Conveyor belts to be removed, cut up and disposed offsite;
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition;
- Concrete slabs and footings will be broken and buried on site. The concrete (and metal) will be broken up and disposed of in the box cut;
- Revegetate where self-succession has not been successful;
- Monitor and maintain vegetation establishment;
- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Rehabilitation of Product Stockpiles and Topsoil Stockpile footprint areas

- All stockpiled product must be removed;
- If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;
- Rehabilitated areas must be shaped to be free draining and roughly emulate the surrounding surface topography;
- Rip dump and stockpile footprint areas to alleviate compaction;
- Monitor and maintain vegetation establishment;
- Revegetate where self-succession has not been successful;
- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Rehabilitation of Diesel Storage and Supply areas

- Remove diesel tanks (by owner) and associated infrastructure from site (it is assumed that all potential contamination is removed during operations);
- Thereafter, demolish concrete bund wall and dispose of contaminated material at a hazardous waste facility;
- Once the site has been cleared of all infrastructure and rubble and no contamination is present, the exposed area should be reshaped to create a gently sloping, free-draining topography;
- Revegetate where self-succession has not been successful;
- Monitor and maintain vegetation establishment; and
- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Also refer to Table 61 for a summarised table.

1.q Period for which the Environmental Authorisation is required

The Environmental Authorisation is required for the life of mine, which is in excess of 27 years. The exploration activities will be undertaken within the following five (5) years.

1.r Undertaking

The undertaking by the Application to meet the requirements of this section is provided in Part B (EMPr) and is applicable to both the EIA report and EMPr.

1.s Financial Provision

The amount that is required to both manage and rehabilitate the environment in respect of rehabilitation is R27 873 237.30 (excluding VAT) (refer to the table overleaf which indicates the project areas highlighted in grey). Please refer to Annexure 7 for the detailed assessment.

Table 57: Draft Financial Provision Calculation (grey highlights are project application specific)

930		**Planned Extention area**												
931														
932		**Demolish infrastructure**												
933														
934	Overland conveyor	Demolish suspended conveyors	149	0	m	R461,91	R0,00			149	275	m	R461,91	R127 024,90
935	Discharge pipelines1	Remove surface pipeline	115	0	m	R92,04	R0,00			115	300	m	R92,04	R27 610,79
936	Diesel Pipelines	Remove surface pipeline	115	0	m	R92,04	R0,00			115	1500	m	R92,04	R138 053,97
937	Fence	Remove wire fence	147	0	m	R14,57	R0,00	Assume wire fence		147	2940	m	R14,57	R42 846,95
938	Reservoir	Remove steel tank	142	0	Item	R61 468,53	R0,00	Area= 180 m2, therefore a diameter = 15 m		142	1	Item	R61 468,53	R61 468,53
939	Product stockpile bund	Demolish concrete slab	107	0	m³	R314,69	R0,00	Assume 150 mm concrete		107	14	m³	R314,69	R4 248,31
940	Security building	Demolish single storey brick building	101	0	m²	R310,73	R0,00	Assume single storey brick building		101	3450	m²	R310,73	R1 072 032,51
941	Change house (similar to Office Area)	Demolish single storey brick building	101	0	m²	R310,73	R0,00	Assume single storey brick building		101	630	m²	R310,73	R195 762,46
942	Reservoir	Remove steel tank	141	0	Item	R16 764,14	R0,00	Assume diameter = 0-10 m		141	1	Item	R16 764,14	R16 764,14
943	Sewage Treatment plant	Demolish concrete slab	108	0	m³	R440,57	R0,00	Limited information available. Should update once more information is available		108	90	m³	R440,57	R39 650,91
944														
945	TMM Workshop	Demolish double storey steel structure	136	0	m²	R349,74	R0,00			136	200	m²	R349,74	R69 948,46
946		Demolish concrete slab	107	0	m³	R314,69	R0,00	Assume double storey steel structure		107	30	m³	R314,69	R9 440,69
947								Assume 150 mm concrete						
948		**Demolition Total**					R -							**R 1 804 852,64**
949														
950														
951		**Rehabilitation**												
952														
953	General area	Rip Soil	132	0,00	ha	R8 671,83	R0,00			132	0,50	ha	R8 671,83	R4 309,90
954		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	4970	m²	R23,80	R118 309,69
955		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	0,50	Ha	R32 542,27	R16 173,51
956														
957	Exploration roads and other Access Roads	Gravel road	134	0	m²	R7,89	R0,00	Assume gravel road		134	250000	m²	R7,89	R1 971 817,71
958		Rip Soil	132	0,00	ha	R8 671,83	R0,00			132	25,00	ha	R8 671,83	R216 795,68
959		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	250000	m²	R23,80	R5 951 191,90
960		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	25,00	Ha	R32 542,27	R813 556,77
961														
962	Drill pad	Rip Soil	132	0,00	ha	R8 671,83	R0,00	Assume only footprint area		132	14,00	ha	R8 671,83	R121 405,58
963		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	140000	m²	R23,80	R3 332 667,46
964		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	14,00	Ha	R32 542,27	R455 591,79
965														
966	Truck Parking	Rip Soil	132	0,00	ha	R8 671,83	R0,00	Assume only footprint area		132	2,80	ha	R8 671,83	R24 281,12
967		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	28000	m²	R23,80	R666 533,49
969														
970	Load out area	Rip Soil	132	0,00	ha	R8 671,83	R0,00	Assume only footprint area		132	0,90	ha	R8 671,83	R7 804,64
971		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	9000	m²	R23,80	R214 242,91
972		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	0,90	Ha	R32 542,27	R29 288,04
973														
974	Exploration Area, Laydown and Truck Stop	Rip Soil	132	0,00	ha	R8 671,83	R0,00	Assume only footprint area		132	45,60	ha	R8 671,83	R395 435,32
975		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	456000	m²	R23,80	R10 854 974,02
976		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	45,60	Ha	R32 542,27	R1 483 927,54
977														
978	Metallurgical plant stockpile area	Rip Soil	132	0,00	ha	R8 671,83	R0,00	Assume only footprint area		132	0,70	ha	R8 671,83	R6 070,28
979		Replace soil and spread to a depth of 300mm thick	127	0	m²	R23,80	R0,00			127	7000	m²	R23,80	R166 633,37
980		Revegetate areas	128	0,00	Ha	R32 542,27	R0,00			128	0,70	Ha	R32 542,27	R22 779,59
981														

1.s.i Explain how the aforesaid amount was derived

1.s.i.1 Appointed Specialist

Digby Wells Environmental (hereafter Digby Wells) was appointed by Dwarsrivier Mine to complete the financial provision assessment for the rehabilitation and closure of the mine and in the process also considered the projects being applied for. Please refer to Annexure 7 for the detailed assessment.

The following sections presents the key considerations in how the financial provision amount was derived:

1.s.i.2 Philosophy and Legal Considerations

According to the 2018 Financial Provision Report, successful closure depends on setting, continually reviewing and validating and finally meeting closure goals that align with company and stakeholder requirements. There should be minimal residual risk to the environment, and the community should realise benefits that will continue to exist without further involvement from the company. This philosophy was considered in the development of the financial provision for the current mine, life of mine and proposed projects.

The vision of mine closure should be to ensure that a process is established to guide all decisions and actions during a mine's life such that:

- Future public health and safety are not compromised;
- Environmental resources are not subject to physical and chemical deterioration;
- The post-mining use of the site is beneficial and sustainable in the long-term;
- Any adverse socio-economic impacts are minimised; and
- The opportunity is taken to maximize socio-economic benefits.

The above vision has been incorporated in the development of the management measures for the proposed projects.

In order to derive the financial provision, the following legislation was also considered:

Table 58: Financial Provision Legislation

Applicable legislation and guidelines	Details
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –
	a) Prevent pollution and ecological degradation;
	b) Promote conservation; and
	c) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development
The Conservation of Agricultural Resources, 1983 (Act No. 43 of 1983)	The Conservation of Agricultural Resources Act, 43 of 1983 (CARA) states that the degradation of the agricultural potential of soil is illegal; and
	The CARA requires that protection of land against soil erosion and the prevention of water logging and salinization of soils means of suitable soil conservation works to be constructed and maintained.

Applicable legislation and guidelines	Details
Mineral and Petroleum Resource Development Act. 2002 (Act No. 28 of 2002)	The MPRDA sets out the requirements relating to the development of the nation's mineral and petroleum resources. It also aims to ensure the promotion of economic and social development through exploration and mining related activities; Section 41 (1) of the MPRDA has been repealed and in terms of Section 24P in the NEMA as amended which provides that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision must guarantee the availability of sufficient funds to undertake the- a) Rehabilitation of the adverse environmental impacts of the listed or specified activities; b) Rehabilitation of the impacts of the prospecting, exploration, mining or production activities, including the pumping and treatment of polluted or extraneous water; c) Decommissioning and closure of the operations; d) Remediation of latent or residual environmental impacts which become known in the future; e) Removal of building structures and other objects; and/or f) Remediation of any other negative environmental impacts. In addition to Section 24P, the Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations were promulgated on the 20 November 2015 (Government Notice No. 1147 published in GG 39425). Regulation 11 of the Financial Provision Regulations requires a holder of a Mining Right to determine the quantum of the financial provision through detailed itemisation of all activities and costs, calculated based on the actual costs of implementation of the measures required for: a) Annual rehabilitation, as reflected in Annual Rehabilitation Plans; b) Final rehabilitation, decommissioning and closure of the mining operations as per the Rehabilitation and Closure Plans (RCPs) which includes the findings of the Environmental Risk Assessment (ERA); and c) Remediation of latent or residual environmental impacts as identified in the ERA.
National Environmental Management Act, 1998 (Act No. 107 of 1998)	The NEMA, as amended was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.*
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	NEMBA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance to the framework set under NEMA. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: ▪ Alien and Invasive Species Lists, 2016 ; ▪ National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations; and ▪ National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GN R.1002, 9 December 2011).
National Water Act, 1998 (Act No. 36 of 1998)	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	According to the NEM:AQA the Department of Environmental Affairs (DEA), the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA. A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS) (GN R 1210 of 2009). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured.

1.s.i.3 Post-Closure Land Use

Another important consideration in the determination of the financial provision is the post-closure land use commitment. Post-closure land use is determined in consultation with stakeholders so that the post closure land use meets the requirements of the stakeholders, within the context of the closure plan. This activity is undertaken for the whole mine lease area affected by mining activities and integrates stakeholder requirements with risk mitigation.

The proposed final land use would be to return the area to wilderness area as committed to in the various EMPr's preceding this application. This would include demolishing surface infrastructure that will not be handed over to a third party and promoting the growth of the surrounding Sekhukhune Mountain Bushveld species. It is evident that the re-establishment of this vegetation biome on site will not be difficult as areas that have already undergone rehabilitation have seen a large success in terms of the revegetation.

As stated in the Fetakgomo-Greater Tubatse Municipality IDP 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". Furthermore, the IDP states that "an opportunity exists to revive and re-introduce indigenous species that were previously endemic to the area". Therefore, rehabilitating the area to a wilderness area is in line with the development goals of the area. It will also provide the opportunity for the reintroduction of indigenous species.

It should be noted that the closure plan may be revised as the mine production progresses; this will ensure that the mine operation take advances in technology and rehabilitation methods into consideration.

1.s.i.4 Methodology and Approach to the Financial Provision Calculation

The following approach was adopted to derive the financial provision (please refer to Annexure 7) for a detailed discussion on each of the individual points:

Risk Assessment:

Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. A baseline Hazard Identification and Risk Assessment (HIRA) was completed as part of the financial provision update. The baseline HIRA is based on a qualitative method. The following process steps were taken:

- A general discussion on hazards and "driving forces" was used to determine things that could "go wrong" during the mine closure;
- The boundaries of the project were defined; and
- Areas within the mining area were defined requiring rehabilitation.

For each of the areas in the process:

- Potential unwanted events were identified;
- Current controls for each unwanted event were identified and recorded;
- The most likely severity, should the event occur, and likelihood of the event occurring were then estimated;
- Based on this, the level of risk was estimated using the risk matrix; and
- For the Highly and Extremely Intolerable events, additional "controls" were recommended to reduce the level of risk.

The following table presents the outcomes of the risk assessment which considered unwanted events:

Table 59: Summary of Potential Extremely and Highly Intolerable Risks

Hazard	Consequence(s)	Primary Risk Category	Raw Risk Rank	Residual Risk
Mine potentially not rehabilitated and closed properly	Injury or fatalities due to inadvertent access to mining areas not properly rehabilitated	Health & Safety	Extremely Intolerable	Highly Intolerable
Potential inadequate budget to adequately rehabilitate the mine	Not achieving the final land use plan	Financial	Extremely Intolerable	ALARP (As low as reasonably practical)
Potential negative effect of future closure on the employees and their future income	Employees and community income source lost	Social	Extremely Intolerable	Maintain
Possible dissatisfaction of communities with future land use	Protests and disruption of closure process	Social	Highly Intolerable	ALARP
Potential unforeseen waste disposal at closure	Economic and environmental cost	Natural Environment	Highly Intolerable	ALARP
Possible sedimentation of streams, rivers and wetlands	Erosion of overburden dumps leading to sedimentation of water resources should overburden material be left on surface after mine closure.	Natural Environment	Highly Intolerable	ALARP
Surrounding Sekhukhune Mountain Bushveld fails to re-establish on site	Loss of biodiversity	Natural Environment	Highly Intolerable	ALARP
Potential changes in future legislation	Closure requirements more stringent with a cost implication	Financial	Highly Intolerable	Maintain

Proposed Control Measure Identification

The following control measures or management actions are proposed for the potential highly intolerable residual risks:

Table 60: Risk Assessment Control Measures

Hazard	Possible New Control Measure(s)
Mine not rehabilitated and closed properly leading to injury or fatalities as a result of inadvertent access to mining areas.	Closure management plan to be understood and strictly followed. Health and Safety Department to be involved in closure of sites.

Consideration of Approved Environmental Management Programme Closure Actions

The following table specifically highlights closure actions important to the proposed activities:

Table 61: Summary of Rehabilitation and Closure Actions (highlighted portions applicable to this application)

Target Area	Main Actions
Infrastructure and Plant Area	**Infrastructure such as the offices, administration buildings and workshops should be removed, unless legally transferred or sold to another party;** **If complete infrastructure removal is chosen, all infrastructure should be demolished to 1m below surface and the demolition rubble removed and taken to the nearest waste facility, or as per the approved EMPr (December 2010), all rubble that is created by the demolition of the plant area must be disposed of in the open mining pit. The transport of the rubble and discard materials should be done in a cost effective way;** **If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;** **Rip disturbed areas to alleviate compaction;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Overburden, WRD and **Product Stockpiles**	**All stockpiled product must be removed;** **If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;** Use overburden material in rehabilitation efforts (infilling, backfilling etc.); **Rehabilitated areas must be shaped to be free draining and roughly emulate the surrounding surface topography;** **Rip dump and stockpile footprint areas to alleviate compaction;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Tailings Storage Facility (F1)	Remove paddocks infrastructure prior to closure; Construction of spillway into existing upslope storm water channel; Place breaker layer on side slopes; Place rock grid for placement of waste rock cross walls; Transport of remnant waste rock for construction of upper surface cross walls (a waste rock inventory needs to be done to determine if there is enough material available) Facilitate drainage from upper surfaces of TSF to storm water channels; Conduct routing of storm water flow along dump toe; Establish vegetation on TSF as per engineering designs; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Tailings Storage Facility (F2)	Establish vegetation on TSF footprint after reclamation; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Target Area	Main Actions
Explosive Magazine	Demolish and remove infrastructure; The footprint area should be ripped to alleviate compaction and to assist with vegetation establishment; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Sewerage Plant	The sewerage plant will be used and maintained by the future occupiers of the land after an agreement has been set up.
Roads and Parking Areas	**Mine roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed;** **Removal of all signage, fencing, shade structures, traffic barriers, etc.;** **All 'hard top' surfaces to be ripped and bitumen/concrete removed along with any culverts and concrete structures;** **All concrete lined drainage channels and sumps will be demolished and removed;** **All potentially contaminated soils are to be identified and should be removed and remediated;** **All haul roads that have been treated with saline dust suppression water need to be treated as "sealed" roads with the upper surface ripped and removed to designated contaminant disposal areas;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Linear infrastructure (conveyors associated with Product Stockpile)	**All power and water services to be disconnected and certified as safe prior to commencement of any demolition works;** **Conveyor belts to be removed, cut up and disposed offsite;** **Salvageable equipment will be removed and transported offsite prior to the commencement of demolition;** **Concrete slabs and footings will be broken and buried on site. The concrete (and metal) will be broken up and disposed of in the box cut;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
PCDs, **Silt Traps** and **Water Pipelines (silt traps if required at the truck parking area and water pipelines to and from the reservoir)**	Desilt the pollution control dams; **Desilt the silt traps and the surrounding area that has been affected by removing silt to a depth of 500mm;** Remove liners – these should be disposed of at the correct hazardous waste disposal facility; Doze the dam walls; Remove supporting plinths for pipeline as well as foundations and other associated infrastructure; **Remaining structures should be demolished to 1m below surface and the demolition rubble removed and any re-usable items should be removed from the site;** **Soil should be tested for contamination;** **If contamination is discovered, this soil should be removed and disposed of in the appropriate waste disposal facility;** **The footprints of dams must be ripped to 200mm;** **Appropriate topsoil sourced from the topsoil stockpiles should be replaced to a minimum thickness of 300 mm on the rehabilitated areas;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Salvage Yard	The footprint area should be ripped to alleviate compaction and to assist with vegetation establishment; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Helicopter Pad	The footprint area should be ripped to alleviate compaction and to assist with vegetation establishment; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Target Area	Main Actions
Diesel Storage Tanks	**Remove diesel tanks (by owner) and associated infrastructure from site (it is assumed that all potential contamination is removed during operations);** **Thereafter, demolish concrete bund wall and dispose of contaminated material at a hazardous waste facility;** **Once the site has been cleared of all infrastructure and rubble and no contamination is present, the exposed area should be reshaped to create a gently sloping, free-draining topography;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Waste bins and Site fencing	Waste bins and fencing to be removed from site; If any concrete foundations were constructed, these must be removed up to 500 mm below surface; Once the site has been cleared of all infrastructure and rubble and no contamination is present, the exposed area should be reshaped, if necessary, to create a gently sloping, free-draining topography; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Weighbridge (located at the entrance to the proposed truck parking area)	**Remove supporting foundations and other associated infrastructure;** **The footprint area should be ripped to alleviate compaction and to assist with vegetation establishment;** **Monitor and maintain vegetation establishment;** **Remove alien invasive vegetation; and** **Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.**
Topsoil Stockpiles	**Use topsoil material as part of rehabilitation activities;** **The stockpile footprint area should be ripped to alleviate compaction and to assist with vegetation establishment;** **Monitor and maintain vegetation establishment; and** **Remove alien invasive vegetation.**
Discard Storage Facility	Backfill the discard into the pits; Remove contaminated soil from affected area; Contaminated material will then need to be disposed of into the voids when waste licence has been approved; 75% of the discard will be backfilled into the voids and the remaining 25% will be ripped will receive the following actions: - The area will be shaped to reduce the likelihood of ponding occurring on surface and to blend in with the surrounding topography; - The area should be ripped to 500 mm to reduce compaction; - Appropriate topsoil sourced from the topsoil stockpiles should be replaced to a minimum thickness of 300 mm on the rehabilitated areas; - Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Underground Access Portals	Any overburden material extracted during operation that was stockpiled will be used to rehabilitate the incline shafts once mining is complete; Remove infrastructure and conveyors associated with the underground access portals; Seal all underground access portal openings with a concrete plug and according to engineering designs; Backfill stockpiled overburden material and storm water berm material into the incline portal; Shape the area to create a gently sloping, free-draining topography. Re-instate natural drainage lines to limit erosion and sediment build up within local river courses; Appropriate topsoil should be replaced (all usable topsoil stripped from these areas should be placed back in these areas) in all rehabilitated areas; Monitor and maintain vegetation establishment; Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Target Area	Main Actions
Ventilation Shaft	Remove all vent shaft related infrastructure; Close shaft entrance with concrete seal as per engineering designs; Appropriate topsoil should be replaced to a minimum of 300 mm thick in all rehabilitated areas; Monitor and maintain vegetation establishment; Remove alien invasive plants; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
ROM Pad	Remove contaminated layer; Contaminated material will need to be disposed of at a hazardous waste facility or on the Discard Storage Facility; The area will be shaped to reduce the likelihood of ponding occurring on surface and to blend in with the surrounding topography; The area should be ripped to 500 mm to reduce compaction; Appropriate topsoil sourced from the topsoil stockpiles should be replaced to a minimum thickness of 300 mm; Monitor and maintain vegetation establishment; Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Borrow Pit	Will be shaped to a free draining topography and vegetated; Monitor and maintain vegetation establishment; Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

1.s.i.5 Methodology

A closure cost model has been compiled using Microsoft Excel. The closure cost model consists of an input sheet, containing measurements of the infrastructure, a standard rate sheet and a summary sheet, which summarises the costs for closure. The closure cost model calculates the cost of demolishing, removing and rehabilitating each component of the mining area infrastructure.

The infrastructure areas and other areas affected by mining activities were measured from plans provided by Dwarsrivier Mine.

A one day site visit was conducted by the specialist on the 15th of May 2018 to ground truth areas on site. Measurements that were taken electronically have been standardised to ensure that costs are consistent and easily updatable. All measured areas and infrastructure is mapped using GIS software. Various assumptions were made in the development of the model which is stipulated in Chapter 14.2 of Annexure 7.

1.s.ii Confirm that this amount can be provided for from operating expenditure.

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

1.t Deviations from the approved Scoping Report and Plan of Study

1.t.i Deviations from the methodology used in determining the significance of potential environmental impacts and risks

The methodology to rate the impacts and risks associated with the proposed project detailed in this EIA report have not deviated from those described in the Scoping Report.

The only deviation is the change in activities. The discharge of fissure water into the Groot Dwarsrivier has been excluded from the project scope at this time.

1.t.ii Motivation of the deviation

No deviations from the methodology proposed in the Scoping Report.

The change in activities, is based on the fact that further aquatic and hydrological studies are required to understand the integrities of discharge, as well as operational management requirements.

1.u Other information required by the Competent Authority

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

1.u.i.1 Impact on the socio-economic conditions of any directly affected person

The project involves the internal improvement of logical infrastructure on site. The only activities which may impact on socio-economic conditions are the following:

Exploration activities, planned within the surface rights of Two Rivers Platinum Mine. For this potential impact, consultation has been initiated with the mine and the necessary agreements and protocols will be drafted in order to ensure that all parties can continue with planned mining activities.

Use of the local road leading to the proposed truck parking area and which served as an access road to Two Rivers Platinum Mine. The unplanned and unscheduled use of the road by Dwarsrivier Mine trucks may impact on access and logistical concerns to the transportation of staff via buses to Two Rivers Platinum Mine. For this purpose, consultation has been initiated between the parties and the necessary scheduling of trucks entering Dwarsrivier Mine will be undertaken in consultation with Two Rivers Platinum Mine.

Land Claims are present on site. The Department of Land Affairs have been notified of the project. It should be noted that the activities planned are within privately owned land and within approved Mining Right Areas issued by the DMR.

In general (and not specific to this project only), from a social perspective, the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMPr).

<u>Maximise Employment Opportunities and Limit Skills Inequities</u>

Objective	Maximise local employment opportunities and limit skills inequities associated with the construction and operation	
Mitigation: Action/control	Responsibility	Timeframe
Prioritise local labour in the recruitment process as part of the company's own recruitment policy or as part of contractor management plan during construction and operations	Human resources /Social and Labour Plan (SLP) officer	Before construction activities commences
Meet the targets of mining legislation and the relevant mining charter for employment of Historically Disadvantaged South Africans (HDSA) in management positions and core skills	Human resources /SLP officer	Before construction activities commences
Put a procurement strategy as well as a contractor management plan (if relevant) in place to ensure that as close to 100% as possible local employment target in terms of unskilled labour is met	Human resources /SLP officer	Before construction activities commences
Up-skill the local labour force as per SLP	Human resources /SLP officer	Before construction activities commences
Develop a database of goods and services that could potentially be outsourced to the local community	Supply chain management	Before construction activities commences
Where local contractors are used, put a contractor management plan in place (if relevant) to ensure that the local employment and procurement targets of the operations are met	Supply chain management	Before construction activities commences
Performance Indicator	% local labour employed in different skill categories % HDSA in management positions Training programmes completed by local labour force % of goods and services procured from local community by type of product	
Monitoring	Annually as per SLP and procurement strategies	

Minimise external costs for the local community

Objective	**Minimise external costs for the local community**	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Implement management measures of specialist reports (ground and surface water and transport)	Environmental Officer	Before construction/ during planning phase
Establish a community forum to discuss potential complaints related to environmental considerations	Environmental Officer	During construction phase
Participate on a regular basis in the local business chambers and/or mining forums and address issues that could negatively impact on the area	Environmental Officer	During construction phase
Performance Indicator	The number of community complaints received and resolved The number of chamber meetings attended, complaints received and resolved	
Monitoring	Per quarter (4 times a year)	

Minimise the negative economic impacts related to mine closure

Objective	**Minimise the negative economic impacts related to mine closure**	
Mitigation: Action/control	**Responsibility**	**Timeframe**
As per the requirements of the SLP, develop mechanisms to assist employees, prior to retrenchment date in the transition phase after closure of the operations including portable skilled development programmes during the operational phase of the mine, providing assistance in accessing available and suitable jobs with other local mines or companies etc.	Human resources/ SLP officer/	During operations/ before closure
Focus on non-core related local supply links during the operational phases of the mine to facilitate easier transitioning of local suppliers to other costumers	Supply chain/procurement	During construction
Plan community projects with an exit strategy of which beneficiaries are aware of	SLP officer, corporate social investment programme	During operations/ before closure
Performance Indicator	% spending on non-core mining local inputs % of employees that receive portable skills training % of retrenched employees placed in alternative employment Exit strategies for every community investment programme	
Monitoring	Annually/ just before closure	

1.u.i.2 Impact on any National Estate referred to in Section 3(2) of the National Heritage Resources Act

All impacts on heritage conditions are assessed in the Heritage Impact Assessment (Annexure 6). Based on the available information, no unmitigated/ permanent impact on the natural estate will take place as part of this project.

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

> The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as Appendix 4).

Information regarding the baseline and potential impacts for this Dwarsrivier Mine project, is based on the existing information available, discussions with stakeholders (refer to Annexure 4), specialists (Annexure 6), the applicant and discussions with authorities (Annexure 5 and Annexure 4). The EAP has included all identified impacts, based on the current scope of the project, in this EIA and has assigned appropriate management measures to reduce and manage each identified impact, which are included in this EMPr.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1.a Contact Person and Correspondence Address

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

Table 62: 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 EAP's experience:

Table 63: Experience of EAP

Name	Position	Qualification	Professional Registrations	Experience
Tanja Bekker	Principal Practitioner	M.Sc. Environmental Management (RAU), now Johannesburg University)	Certified member of the Environmental Assessment Practitioners Association of South Africa (October 2013) 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	14 Years

Please refer to Annexure 2 for the EAPs Curriculum Vitae.

Education

B.Sc. Earth Sciences (Geography & Geology) – RAU (University of Johannesburg)
B.Sc. Geography Honours - RAU (University of Johannesburg)
M.Sc. Environmental Management - 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) Board and is also a Certified Environmental Assessment Practitioner (EAP) with the Interim Certification Board of Environmental Assessment Practitioners of South Africa (EAPSA), a legal requirement stipulated by 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 14 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 (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.

Table 64: 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 Grootteboom 373KT		
Postal address:	PO Box 567, Lydenburg		
Postal code:	1120	Cell:	+27 (0) 082 863 6633
Telephone:	+27 (0) 13 230 5300	Fax:	+27 (0) 13) 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 65: 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	National Water Act, 1998 (NWA)	Regulation 4b (GN704) Exemption for undermining 2006	16/2/7/B400/C83/1	12 September 2006
3	NWA	Overall Water Use Licence (WUL)	16/2/7/B400/C83	21 January 2008
4	MPRA	EMPr	-	December 2010
5	NWA	WUL – Tailings Dam	04/B41G/G/792	8 July 2011
6	National Environmental Management Act, 2004 (NEMA)	Environmental Authorisation for the proposed construction of a new Tailings Storage Facility	12/1/9-7/1e/GS4	9 July 2011
7	MPRDA	Dwarsrivier Mine Tailings Storage Facility Environmental Management Programme	LP30/5/1/3/2/1(179)EM	22 August 2011
8	National Environmental Management: Waste Act, 2008 (NEM:WA)	Waste Licence – Hazardous Waste Temporary Storage Facilities[2];	12/9/11/L290/5	21 July 2011
9	MPRDA	Approval for Three Plants	LP30/5/1/3/2/1 (179)EM	11 January 2012
10	NEM:WA	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	NEM:WA & NEMA	Integrated Environmental Authorisation	179EM	15 February 2018

The decommissioning of the diesel tanks are for the existing activities addressed in the approved Environmental Management Programme (EMPr), 2010 and the Section 24G Rectification approval, 2014 (see highlights above).

Copies of the Environmental Authorisations are available from Dwarsrivier Mine.

1.b Description of the Aspects of the Activity

The activities associated with this EMP is presented in Section 1.d of Part A of this report. The specific aspects associated with the activities are presented in Section 1.g.v.1.

1.c Composite Map

Refer to the following figures for the sensitivities assessed:

- Figure 78: Conceptual presentation of the zones of regulation in terms of NEMA and GN704 in relation to the freshwater resources within the Mining Right A
- Figure 79: Conceptual presentation of the zones of regulation in terms of NEMA and GN704 in relation to the freshwater resources associated with the proposed capital infrastructure development
- Figure 80: Conceptual presentation of the zones of regulation in terms of GN509 as it relates to the NWA, in relation to the freshwater resources within the Mining Right Area
- Figure 81: Conceptual presentation of the zones of regulation in terms of GN509 as it relates to the NWA, in relation to the freshwater resources associated with the proposed capital infrastructure development

[2] 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.

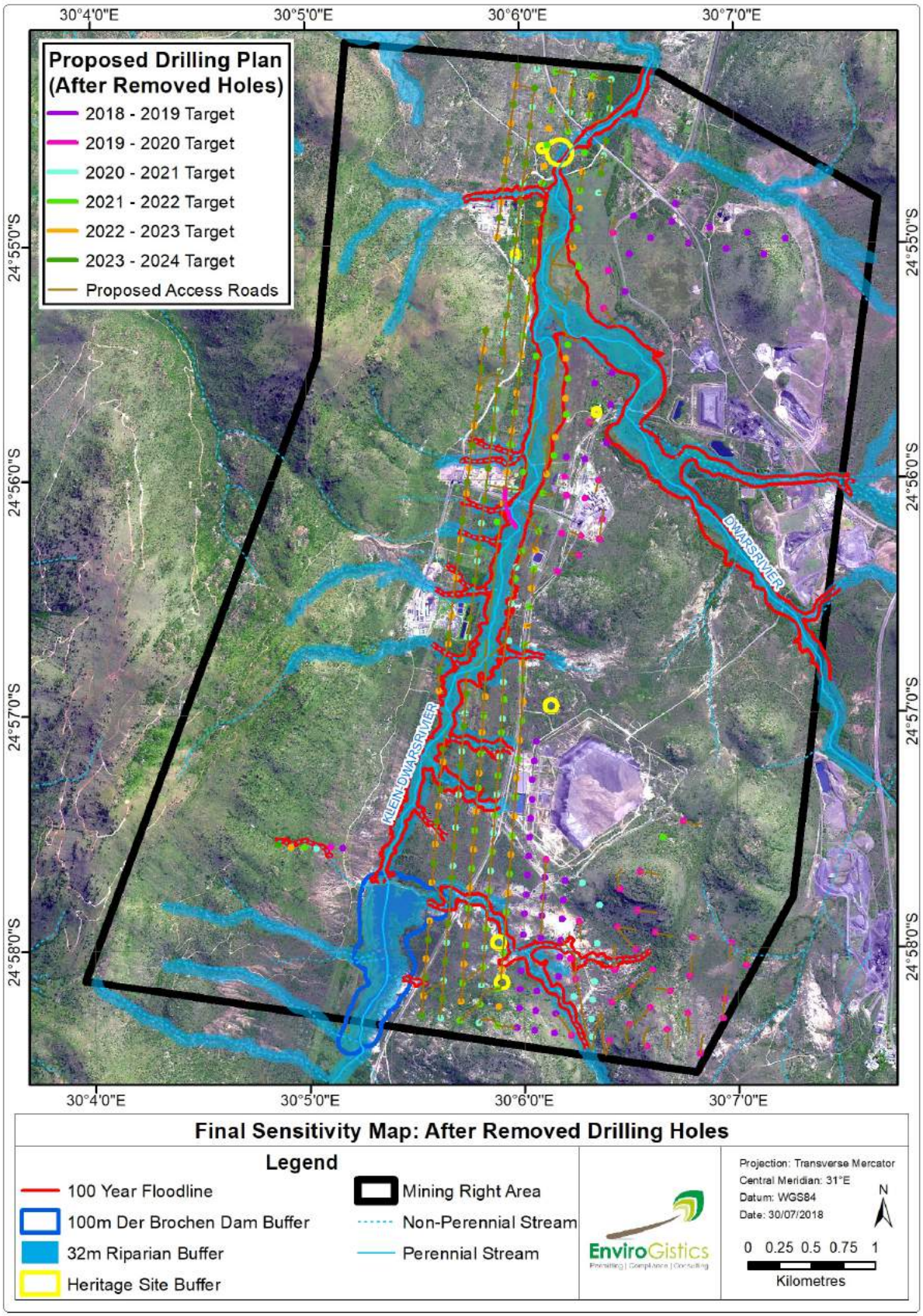


Figure 82: Final Draft Site Map, presenting the outcome of the various specialist studies undertaken.

1.d Description of Impact Management Objectives including management statement

1.d.i Determination of closure objectives

The proposed final land use would be to return the area to wilderness area. This would include demolishing surface infrastructure that will not be handed over to a third party and promoting the growth of the surrounding Sekhukhune Mountain Bushveld species. It is evident that the re-establishment of this vegetation biome on site will not be difficult as areas that have already undergone rehabilitation have seen a large success in terms of the revegetation.

As stated in the Fetakgomo-Greater Tubatse Municipality 2018/2019 draft Integrated Development Plan (IDP) 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" (FGTM IDP 2018). Furthermore, the IDP states that "an opportunity exists to revive and re-introduce indigenous species that were previously endemic to the area". Therefore, rehabilitating the area to a wilderness area is in line with the development goals of the area. It will also provide the opportunity for the reintroduction of indigenous species.

The specific closure objectives for Dwarsrivier Mine are:

- To operate within the enviro-legal ambits of South Africa;
- To be aware of the latest environmental legal requirements;
- To prevent the sterilisation of any future potential ore reserves;
- Limit the impact of the activities on the Ecological Setting of the area;
- Operate the water management circuit on site to increase mining efficiency and reduce the need for maintenance of these facilities;
- Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation;
- Protect the soil resources within the area in which the mine operates;
- Remain within the designated area demarcated for activities;
- Remain within the NEM:AQA, 2004 Dust Regulation guidelines for rural communities;
- Protect heritage resources for future generations;
- Protect Fauna and Flora;
- Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations;
- Follow the waste hierarchy approach;
- Protect the integrity of the Storm Water Management System;
- Restore the area to its intended final land use;
- This ensure that the surface rights belonging to third parties (exploration area) is returned to its pre-exploration environmental conditions.

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Specific objectives associated with this application include:

<u>Rehabilitation of infrastructure areas (Laydown Area infrastructure, Security Buildings, Treater Water Reservoir, North Mine infrastructure and Exploration Pads)</u>

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

- Infrastructure such as the offices, administration buildings and stores should be removed, unless legally transferred or sold to another party;
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate;
- If complete infrastructure removal is chosen, all infrastructure should be demolished to 1m below surface and the demolition rubble removed and taken to the nearest waste facility, or as per the approved EMPr (December 2010), all rubble that is created by the demolition of the area must be disposed of in the open mining pit. The transport of the rubble and discard materials should be done in a cost effective way;
- If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;

- Rip disturbed areas to alleviate compaction;
- Monitor and maintain vegetation establishment;
- Remove alien invasive vegetation;
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion;
- Any surface water management infrastructure will be maintained to ensure they are stable and functional; and
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Rehabilitation of Roads and Linear Infrastructure (Conveyors, Exploration Roads, Truck Parking, Access Roads)

- The weighbridge at the Truck Parking Area will involve the removal of supporting foundations and other associated infrastructure;
- Roads should be rehabilitated as per the management measures, unless legally transferred or sold to another party;
- Mine roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed;
- Removal of all signage, fencing, shade structures, traffic barriers, etc.;
- All 'hard top' surfaces to be ripped and bitumen/concrete removed along with any culverts and concrete structures;
- All concrete lined drainage channels and sumps will be demolished and removed;
- All potentially contaminated soils are to be identified and should be removed and remediated;
- All haul roads that have been treated with saline dust suppression water need to be treated as “sealed” roads with the upper surface ripped and removed to designated contaminant disposal areas;
- All power and water services to be disconnected and certified as safe prior to commencement of any demolition works;
- Conveyor belts to be removed, cut up and disposed offsite;
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition;
- Concrete slabs and footings will be broken and buried on site. The concrete (and metal) will be broken up and disposed of in the box cut;
- Revegetate where self-succession has not been successful;
- Monitor and maintain vegetation establishment;
- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Rehabilitation of Product Stockpiles and Topsoil Stockpile footprint areas

- All stockpiled product must be removed;
- If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility;
- Rehabilitated areas must be shaped to be free draining and roughly emulate the surrounding surface topography;
- Rip dump and stockpile footprint areas to alleviate compaction;
- Monitor and maintain vegetation establishment;
- Revegetate where self-succession has not been successful;
- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Rehabilitation of Diesel Storage and Supply areas

- Remove diesel tanks (by owner) and associated infrastructure from site (it is assumed that all potential contamination is removed during operations);
- Thereafter, demolish concrete bund wall and dispose of contaminated material at a hazardous waste facility;
- Once the site has been cleared of all infrastructure and rubble and no contamination is present, the exposed area should be reshaped to create a gently sloping, free-draining topography;
- Revegetate where self-succession has not been successful;
- Monitor and maintain vegetation establishment; and

- Remove alien invasive vegetation; and
- Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

1.d.ii The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Please refer to Table 51 to Table 54 for a detailed list of all impacts and management measures. The following section describes general rehabilitation strategies to assist with site wide rehabilitation.

Water and Aquatic Resources:

Management of the water and aquatic resources typically should include the following:

- Demolition footprint must be clearly demarcated and no related activities, including the movement of vehicles, must be permitted to occur outside of the footprint area;
- All related waste and rubble must be removed from site and disposed of according to relevant SABS standards. No waste must be permitted to enter freshwater resources;
- Edge effects such as erosion must be monitored and managed;
- All areas affected by stockpiling during the operational phase of the mine should be rehabilitated and stabilised using cladding or a suitable grass mix to prevent sedimentation of the freshwater resources in the area;
- Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, a clean water diversion system may remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible;
- Upon closure all haul and access roads which are no longer required, as well as all unnecessary mining infrastructure (including temporary structures) should be removed to minimise the impacts on the aquatic resources of the area beyond the life of mine. Compacted soils should be ripped and revegetated with indigenous vegetation to prevent erosion, sheet runoff, and discourage the establishment of alien floral species post-closure;
- 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;
- All affected areas should be resloped and dressed with topsoil where necessary and reseeded with indigenous grasses if self-succession is not achieved;
- It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected; and
- Ongoing aquatic biomonitoring should take place throughout the closure phase of the mine and should continue into the post closure phase to define latent impacts that need to be mitigated

Soil Management

Soil management measures typically include the following:

- The rehabilitated areas should be profiled to replicate natural landforms;
- When there is insufficient soil material for use, select suitable sub surface materials (i.e. those that are neither saline nor sodic) to use as a substitute for soil when covering rehabilitated areas; and
- Ensure organic content is sufficient to sustain microbial activity, encourage infiltration, limit runoff and improve soil stability. Despite not being practical, mulch with grass clippings (cut when seed content is at its highest) as an attempt to provide a seed bank.

Shaping and Levelling

Disturbed areas should be shaped and levelled to create a gently sloping, free-draining topography. Re-instate natural drainage lines to limit erosion and sediment build up within local river courses.

Soil Compaction Alleviation

In order to alleviate or reduce soil compaction the following should take place:

- Rip all disturbed footprints and heavily compacted areas (hard pans, access roads);
- Soil should be ripped when moist to allow for maximum alleviation of compaction; and
- Soils should be moved and/or replaced when they are dry to minimise compaction.

Soil Amelioration

Soil amelioration should be done as follows:

- Following de-compaction, an acceptable seed-bed should be produced through surface tillage;
- Soil should be sampled and analysed once placed on rehabilitated areas;
- Fertiliser should be applied, if required, to raise the soil nutrient content to the desired levels and maintenance should continue.

Erosion Control

The following should be done as part of erosion control on rehabilitated land:

- Unnecessary disturbance and vegetation removal should be avoided and prevented;
- Pre-development drainage patterns should be reinstated as far possible; and
- Rehabilitated areas should be monitored for erosion.

Vegetation Establishment

The establishment of natural vegetation is a necessary component of the decommissioning and rehabilitation phase. The overall objectives for the establishment of natural vegetation of reshaped areas are to:

- Prevent erosion;
- Avoid soil loss;
- Restore the land to the agreed land capability;
- Reduce sedimentation into aquatic ecosystems such as rivers and streams;
- Re-establish ecosystem processes (succession) to ensure that a sustainable land use can be established without requiring excessive fertiliser additions; and
- Restore the biodiversity of the area as far as possible.

In order to ensure vegetation establishment, the following should be done:

- Rehabilitated areas should be properly prepared;
- Growth properties should be improved by the addition of organic matter and fertiliser, where required.
- To ensure successful rehabilitation at Dwarsrivier Mine, it is important to note vegetation types (Sekhukhune Mountain Bushveld) as well as species lists of flora within natural, undisturbed areas prepared through floral specialist studies, so that these can be replaced to some extent once mining has been completed.

Alien Invasive Species Management

- There must be no planting of alien plants within the mining area;
- The transportation of soils or other substrates infested with alien species should be strictly controlled;
- Benefits to local communities as a result of the alien and invasive plant species control programme should be maximised by not only ensuring that local labour is employed, but by also ensuring that cleared alien trees are treated as a valuable wood resource that can be utilised; and
- Regular vegetation monitoring of the site should take place.

Table 66: Environmental Relinquishment Criteria

Environmental Aspect	Closure criteria	Monitoring Requirement	Reporting Requirement
Biodiversity	Ensure establishment of vegetation has a basal cover of a reference site 3 years post-closure and that it is self-sustaining and can be measured over a 3 year period after mine closure, indicating that natural succession has occurred.	Quarterly vegetation monitoring and rehabilitation monitoring	Vegetation Monitoring Reports.

Environmental Aspect	Closure criteria	Monitoring Requirement	Reporting Requirement
Groundwater	Groundwater qualities after mine closure need to comply with the qualities as stipulated in the WUL and the appropriate standards set by the DWS and South African National Standards (SANS).	Quarterly groundwater monitoring for 3 years after mine closure.	Groundwater Monitoring Reports.
Surface Water	Surface water qualities after mine closure need to comply with the qualities as stipulated in the WUL and the appropriate standards set by the DWS and SANS.	Quarterly surface water monitoring for 3 years after mine closure.	Surface Water Monitoring Reports.
Social	Engagement with stakeholders and employees regarding closure related aspect and formulisation of a retrenchment and downscaling policy demonstrating training initiatives and skills development assisting in employees being upskilled, which would help individuals to seek for alternative employment at the time of closure.	Engagement, training and skills development policies during operational phase.	Records of correspondence, training matrices and records of training.
Air Quality	Dust must comply with the minimum standards and limits as set by the NEM:AQA and applicable regulations and guidelines.	Monthly air quality monitoring during the decommissioning and rehabilitation phase.	Air Quality Monitoring Reports
Soil, Land Capability and Land Use	Post land use mining assessment to determine status of rehabilitated areas with respect to soil quality and that rehabilitated areas have been rehabilitated to an agreed upon land use. In addition to the above, inspections should be undertaken to identify areas of erosion and that erosion measures have been constructed.	Quarterly soil chemistry and physical properties analysis during the rehabilitation phase. Quarterly soil erosion monitoring during the rehabilitation phase.	Soil Quality and Erosion Monitoring Reports.
Erosion	Implementation or construction of erosion control measures.	Geotechnical and hydrological studies of existing structures. Evidence in rehabilitation report that appropriate risk assessment has been	Erosion Monitoring Reports.
Safety	Ensure dangerous mining areas, such as open quarry areas, have been appropriately bunded and appropriate signage erected.	Visual inspections and sign off report by a registered engineer.	Signed off report by registered engineer.

Please refer to Table 61 for the rehabilitation requirements for each of the project areas.

1.d.iii Potential risk of Acid Mine Drainage

The projects in questions will not involve the disposal of waste rock. However, the mine will apply for GN704 exemption for the use of waste rock in the compaction of areas and the construction of roads, etc. According to a Waste Material Management Report undertaken by Escience dated September 2009 it was determined that:

- The acid-base accounting results indicate that the tailings and waste rock at Dwarsrivier Mine are relatively inert, with low levels of potential acid generation and neutralisation. Of importance is the fact that despite the inert nature of the material, the neutralisation exceeds the acid generation in all cases, and generally is at least twice that of the acid generating potential and usually more than four times greater. The probability of acid generation, based on this assessment and correlating with previous work by Groundwater Consulting Services, is considered highly unlikely.
- The expected long-term neutral conditions are very important since this will prevent several of the metals which are found in the waste rock and tailings from going into solution. It therefore follows that, since neutral pH conditions are expected, dissolved metal concentrations should remain low.
- The small quantities of remaining sulphides do produce slightly elevated sulphate values, but concentrations are not expected to increase from the proposed backfilling activities.

Subsequent studies were undertaken during 2018 by iLEH. This study stated that leach tests have an important role in providing information to support the assessment of the environmental risks associated with the material sampled as it determines the concentrations of chemical constituents in soil pore water that may come in contact with surface water bodies, groundwater, fauna and flora. In order to understand the risk of mine residue deposition at the mine, it is important to understand whether or not the leachable chemical constituents are below the threshold values set in the Norms and Standards. Based on the study undertaken the leachable concentrations from the Discard Storage Facility (on the south-western portion of the site) are all below LCT01, which will likely be the material sourced for construction activities.

Based on the specialist studies there are therefore no acid mine drainage expected from activities taking place on site.

Please refer to Annexure 8 for the leach studies undertaken.

1.d.iv Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

Please refer to the section above.

1.d.v Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

Please refer to the sections above. Based on the specialist studies there are no acid mine drainage expected from activities taking place on site.

1.d.vi Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage.

Please refer to the sections above. Based on the specialist studies there are no acid mine drainage expected from activities taking place on site.

1.d.vii Volumes and rate of water use required for the mining, trenching or bulk sampling operation.

No additional water requirements are associated with this Environmental Authorisation.

The Capital Projects will not require the increase in water requirements. The Water Treatment Plant (WTP) currently operational on site, will provide treated water to the Treated Water Reservoir at the peak flow of 480m^3 of water per day. This water will be supplied to the North Mine, South Mine and the Plant. The intention of the mine is to improve year on year on their Water Conservation and Demand Management Plan, for the Water Treatment Plan is a key component.

The Drilling Activities will required 40,000m^3 of water per drill rig. This water will be sourced from the existing mine water allocation (likely from the fissure water tank, located on South Mine). Water will be trucked via bowsers to the drilling sites.

1.d.viii Has a water use licence has been applied for?

A Water Use Licence Application (WULA) has not yet been submitted. A WULA will be submitted prior to the commencement of the proposed project. No activities will be undertaken without the necessary approvals.

The WUL will not only cater for this project, but will be an update of the overall mine WUL to correct all changes and administrative errors. For this project, the following activities may trigger water uses:

- Section 21c&i applications for exploration roads, where these may cross non-perennial drainage channels;
- Section 21b for the storage of water;
- GN704 exemption for the location of infrastructure within the 100m buffer from watercourses, this may be for the Truck Parking, Product Stockpile and Exploration Activities;
- GN704 exemption for the use of discard rock in the construction of berms, roads and parking areas; and
- Section 21g for the construction of the Product Stockpile.

1.d.ix Impacts to be mitigated in their respective phases

Please refer to Table 8 for the discussion on the sizes of disturbance.

Table 67: Impacts to be mitigated in their respective phases (Planning Phase)

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
Planning Phase																
Legal Requirements (Environmental Permits)	1, 2, 3	Legal Compliance	Unlawful water and waste activities, which could lead to NWA Directives and Section 24G Rectification fines.	-14	A legal assessment of all activities and future planned activities must be undertaken annually to ensure that all activities are authorised.	17	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.				x	Compliance in terms of Regulatory Requirements and the implementation of the EMPr.	Appointment of an Independent Environmental Control Officer (ECO) to assess compliance with the EMPr.	Independent ECO	Monthly for the construction phase. Thereafter annual external audits can be undertaken. Monthly update of legal register.
					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 internal audits must be undertaken during the construction phase, where after biannual (twice a year) internal audits can be undertaken (after construction), on the lawful implementation of the Environmental Authorisation. A copy of the Water Use Licence (WUL) must be available on site at all times.		To be aware of the latest environmental legal requirements.	All Departments responsible for development of the mine and associated Capital Projects, must understand the requirements of the environmental legislation and approved Environmental Authorisations and must include such into their planning processes.				x	Compliance in terms of Regulatory Requirements and the implementation of the EMPr.	Monthly environmental meetings must be implemented to discuss the mining plan, implementation thereof, implication on current Environmental Regulations and potential constraints and liabilities. Minutes must be kept of these meetings and action plans with responsibilities must be drafted. The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • Codes of Practice (COPs) • Strategic Operating Plans (SOPs) Management and staff must be trained to understand the contents of these documents and to adhere thereto	Safety, Health, Environment and Quality (SHEQ) Department to coordinate	Monthly Environmental Meetings. Monthly update of legal register. Regular updates of COPs and SOPs. Annual induction which includes the relevant contents of Environmental Authorisations, approved Environmental Reports and applicable Environmental Legislation. No go zones map - immediately
					The following buffers should be maintained: • No activities within 1:100 year flood line. Where access roads crossings are required the necessary NWA approvals should be		Protection of sensitive environments.	Protection of sensitive environments.				x				

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
					obtained and the recommendations in the Aquatic Specialist Report, July 2018 should be adhered to; • No activities of 10m² and more may be undertaken within 32m of the riparian zone unless approved in terms of the NWA and NEMAs; • In terms of the exploration programme, two Iron Age sites were recorded by Stegman & Roodt (2012), these areas should be avoided with a 50m buffer zone around the sites; • The well-known geological monument referred to as the "Dwarsrivier National Monument" is located close to some of the drill pads and will have to be conserved with a buffer zone of 100m; and • Several buildings were identified from the desktop heritage study close to drill pads and should be avoided with a 30m buffer zone.									Environmental Awareness training must be provided to employees. A site layout with all the no-go zones should be compiled.		
					The mine's legal register must be updated to indicate all activities associated with Environmental Authorisations.		Proactive knowledge of potential system errors and/or constraints will avoid potential non-compliance or process delays.	Operational Environmental Management System (EMS) that addresses the needs and responsibilities of all departments.				x				
Relocation of Privately and State (Eskom) Owned	2	Socio-Economic	The relocation of the powerlines, should this be	-12	The mine should obtain approval from Eskom and affected parties regarding	-5		Approved operating procedures, safety files and	x	x			Continuation of economic activities in the areas	Initiate discussions with Eskom regarding the procedures for	Engineering Manager	Immediately

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
Powerline if required around the North Mine Infrastructure Project.			required (applicant owned and/or Eskom owned) could temporarily disrupt Economic Activities in the area which the powerline supplies.		the relocation of the powerlines.			communication structure and compliance thereto.					associated specifically with exploration drilling activities. Compliance with Health and Safety Requirements. Compliance with Environmental Authorisations.	the relocation process.		
														Initiate discussions with the impacted parties.	Engineering Manager	Immediately
					The mine should enter into discussions with Eskom and the affected parties to develop an operating procedure and time line for the removal of the powerlines.		Maintain good relationship with surrounding mines.							Monitor the implementation of the Operating Procedure during the relocation of the powerline (powerline relocation will be undertaken under Eskom environmental procedures).	Environmental Department	During planning phase
					The powerlines may not be removed without the required approvals by Eskom.		No impact on economic activities in the area.	Good relationship with surrounding mines.								During planning phase
Land Claims	Unknown	Socio-Economic	According to the Fetakgomo-Greater Tubatse municipal IDP there are land claims present on the farm Dwarsrivier 372KT. 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	-14	The mine should obtain clarity on the status of the land claims which have been lodged within the Mining Rights Area.	-5	Maintain good relationships with Interested and Affected Parties (I&APs) by participating in the process of land claims.	Compliance with outcomes of restitution claims.				x	Continuation of economic activities in the areas associated specifically with exploration drilling activities. Achieving commitments made in the Mining Works Programme and Exploration Plans.	Ongoing follow up with the Department of Land Affairs to determine the status of the land claims with records kept of discussions.	Legal Department	Quarterly
					The mine should ensure that they are abreast the developments of the land claim assessment and in consultation with the relevant department.									Participate in land claim meetings should these be required.	Legal Department, SHEQ Department and Mine Manager	When required.
					All activities should remain within the approved contracts.		Ensure the practical and economic use of mineral resources within the Mining Right Area.	Good relationship with surrounding mines.						Annual assessment in terms of compliance with the Exploration Programme and Mining Works Programme and legal required reporting to the DMR.	Exploration Geologist and Engineering Department	Annually

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
			within the approved Mining Rights Area.													
Planning the layout of the Exploration Drilling Activities	1	Landowner Relationships	Unlawful access to land or mining activities	-13	Early consultation to determine the requirements of both parties.	-4	Maintain good relationship with surrounding mines.	Approved operating procedures, safety files and communication structure and compliance thereto.				x	Continuation of economic activities in the areas associated specifically with exploration drilling activities. Compliance with Health and Safety Requirements. Compliance with Environmental Authorisations.	Initiate discussions with Two Rivers Platinum regarding the procedures for the procedures and requirements for accessing their surface rights areas.	Engineering Manager	Immediately
					An open channel of consultation must be maintained throughout the process.									Development of COPs and Health and Safety Requirements.	SHEQ Department to coordinate	Immediately
					The Dwarsrivier Chrome Mine Exploration Geologist must undertake a site walkover, with the responsible Two Rivers Platinum Mine representative to determine buffers and no go areas around Two Rivers Platinum Mine infrastructure.									Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Manager	Quarterly, and more regularly if required.
					The Standard Operating Practices (SOP) and/or contactor's SOP for surface exploration drilling must be submitted to Two Rivers Platinum Mine prior to commencement of drilling activities.		No impact on economic activities in the area.	Good relationship with surrounding mines.						Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department	Quarterly
					Where conflict arise the Department of Mineral Resources (DMR) must be involved to facilitate consultation processes.											
	1	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. Placement of drill pads in niche habitat and areas	-13	Clearly demarcate the areas planned for construction in line with the sensitivity maps. Identify existing roads which could be used to access drill pads. No drill sites/ drilling pads may be constructed within the 1:100-year flood line or within 32m from a riparian zone (whichever is the greatest). Where roads are required, existing roads should firstly	-6	Limit the impact on ecological and aquatic resources.	Protection of ecological and freshwater resources.	x					Demarcate all activities in terms of the sensitivity and buffer maps.	Engineering Department and Environmental Department	Immediately

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			of increased sensitivity. Several proposed drill sites were initially located directly within, or less than 10m from, the active channels of: the Groot Dwars, Klein Dwars and Dwars Rivers, the unnamed tributary of the Klein Dwars River, and two of the western ephemeral drainage lines. Additionally, some temporary roads may be located within the 32m buffers and/or 1:100 year flood lines associated with these systems, as well as within the flood lines of the three primary river systems.		be utilised. If new roads are required these should be designed in line with the stipulations of the specialists: • No access roads should be planned parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. • For the access roads, it is proposed that berms are constructed across the width of the road, at a 30° to 40° angle. A search must be undertaken prior to clearance for indigenous plants that can be carefully removed and stored for rehabilitation.										
	1	Heritage	Various heritage resources have been demarcated.	-13	The exclusion zones as stipulated in the heritage assessment should be adhered to and no drilling activities may be undertaken in these areas.	-5	Avoid the impact on heritage resources.	Protection of heritage resources.	x					Demarcate all activities in terms of the sensitivity and buffer maps.	Engineering Department and Environmental Department	Immediately
	1	Socio-Economic	Unlawful and unscheduled access.	-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.	-5	Maintain good relationship with surrounding mines.	Approved operating procedures, safety files and communication structure and compliance thereto.				x	Continuation of economic activities in the areas associated specifically with exploration drilling activities as the area in question is on TRP land as well. Compliance with Health and Safety Requirements.	Initiate discussions with Two Rivers Platinum regarding the procedures for the procedures and requirements for accessing their surface rights areas.	Engineering Manager	Immediately
														Develop an exploration programme which indicates the timeframes and scheduling of drilling activities.	Engineering Manager	Immediately

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
													Compliance with Environmental Authorisations.	Development of COPs and Health and Safety Requirements.	SHEQ Department to coordinate	Immediately
														Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Manager	Quarterly, and more regularly if required.
					It is key to note that the outcomes of this EIA are based on the specialist investigations and have not considered the required safety considerations to ensure comprehensive exploration drilling. It is therefore important that the applicant ensures that the exploration drilling is undertaken in a manner that will ensure non-negotiable safety standards in future mining development. Where exploration activities result in the encroachment of the stipulated buffers, the necessary approvals should be obtained in terms of water and environmental legislation.		Maintain safety standards.	Zero fatalities.						Ensure that exploration and pre-mining planning is undertaken on the required safety, environmental and economic standards.	Mine Manager	Ongoing
					All activities should remain within areas as agreed in the approved contracts.		No impact on economic activities in the area.	Good relationship with surrounding mines.						Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department	Quarterly
					A list of contact people and responsible parties should be finalised.											
Truck Parking, Roads and Transportation	2	Landowner Relationships	Impact on Mining operations of applicant as well as Two Rivers Platinum Mine.	-13	Early consultation to determine the requirements of both parties (Dwarsrivier Mine and Two Rivers Platinum).	-4	Maintain good relationship with surrounding mines.	Approved agreement between Two Rivers Platinum and Dwarsrivier Mines regarding the logistics of road usage.	x			x	Continuation of economic activities in the areas associated specifically with Truck Parking and associated road usage activities. Compliance with Health and Safety Requirements. Compliance with Environmental Authorisations.	Development of an Operating Procedure in terms of logistical requirements of road usage between Two Rivers Platinum and Dwarsrivier Mines.	Legal Department and Engineering Department	Immediately
					Development of a logistic schedule that will be to the advantage of both Dwarsrivier and Two Rivers Platinum Mines in terms of the transportation of workers via bus and product via truck.									Development of COPs and Health and Safety Requirements.	SHEQ Department to Coordinate	Immediately

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LoM				
					An open channel of consultation must be maintained throughout the process.									Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Department	Quarterly, and more regularly if required.
					Initiate discussions with the relevant Roads Agency to determine design requirements of the road.		No impact on economic activities in the area.	Approval from the relevant Roads Agency regarding the design and operation of the road.						Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department.	Quarterly

Table 68: Impacts to be mitigated in their respective phases (Construction Phase)

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM				
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 (Truck Parking, Laydown, Low Grade Stockpile, Topsoil Stockpile)	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. However, around the exploration sites, these areas will also be placed around more steeper, mountainous areas.	-9	The footprint areas of all surface infrastructure (truck parking area, security office, low grade stockpiles etc.) 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 proved insufficient for control, these shall be replaced by fencing. Where possible the exploration activities must avoid the rocky	-5	Activities to remain within demarcated areas. Design facilities to blend into the existing site character as far as practically possible.	No disturbed areas should occur beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	x				Soil erosion and incorrect stockpiling of topsoil in terms of the Topsoil Management Programme on site. .	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements.	Independent ECO and SHEQ Department	SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					outrops as recommended by the ecologist studies.											
					Designs of the facilities (stockpiles and landscaping) must be undertaken by a competent person.											
					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. This is regarded critical for the southern portion of the Mining Right Area where erosion is currently occurring, and it is anticipated to worsen during vegetation clearing, drilling and exploration activities.											
					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.											
					Exploration 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.											
					Access roads for the exploration drilling sites should be limited by utilising existing roads. Where new roads are constructed the necessary approvals in terms of Section 21c&i, should be obtained through the DWS. Note that any excavation of more thatn 10m^2, will require an Environmental Authorisation in terms of the											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					NEMA if this is undertaken within 32m of a watercourse. Where access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle and the necessary erosion controls must e implemented.. Linear infrastructure must as far as practically possible follow the natural contours of the area.											
	1, 2 (Truck Parking, Laydown, Roads, Low Grade Stockpile, Topsoil Stockpile)	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.	-13	Drilling pads within the fallow lands, not currently licensed and/or approved for future developments (such as the Discard Storage Facility expansion and new Eskom substation), should be avoided since these soils can be used for Lucerne grass cultivation for grazing. Alternatively, drilling pads should be placed adjacent to the fallow lands. Should this be not feasible, the footprint of should be restricted within the demarcated areas. Unnecessary disturbances of the potentially arable soils (i.e. Hutton, Bonheim) can be avoided where possible to minimise loss of arable soils. Adhere to Soil Stripping, Soil Stockpiling and Soil Management Plan as part of the original EMPr (Soil Utilisation Guideline). Prior to construction of the road the soil will be stripped and placed on a soil stockpile. Separate stripping, stockpiling and replacing of soil horizons [A (0-30cm) and B (30-60cm)] in the original natural sequence to combat hardsetting and compaction and maintain soil fertility. At least 30cm of soils must be removed or until hard rock is encountered.	-5	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the Mining Right Area.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation. No disturbed areas should remain beyond the demarcated areas. 100% compliance to remain with approved footprint areas.	x			x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept. Induction should be reviewed and updated every 18 months.	Independent ECO and SHEQ Department.	SHEQ: Weekly monitoring. ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. Induction updates: Every 18 months

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Topsoil should be stockpiled on designated topsoil stockpiles, unless around linear infrastructure, where the topsoil could be stockpiled next to the linear structure. The Topsoil Management Plan (2016) should be implemented on all topsoils immediately to ensure that the integrity of the soils are maintained. Where possible separate stockpiling of different soil type groups (to obtain the highest post-mining land capability) should take place. 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. 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. During the construction (and operational) phases of the proposed mining expansion erosion berms should be installed on roadways to prevent gully formation and siltation of the wetland resources. The following points should serve to guide the placement of erosion berms: • Where the track has slope of less than 2%, berms every 50m should be installed; • Where the track slopes between 2% and 10%, berms every 25m should be installed; • Where the track slopes between 10%-15%,											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					berms every 20m should be installed; and • Where the track has slope greater than 15%, berms every 10m should be installed. 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.											
			Direct impact: Soil compaction	-9	The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area. As far as possible drill pads should be accessed through the existing road network. No access roads should be planned parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No permanent access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars and Springkaanspruit) and or identified drainage lines as per the floodline study (2018). Where temporary access roads are required, these must be constructed in line with the specialist recommendations as per the EMPr and should not involve the excavation of 10m^2 or more without the necessary NEMA licenses. A site plan must be developed, indicating the following: • Location of all approved activities; • 1:100 year flood line; • Identified buffer around all watercourses; • All vegetation management zones as per the Biodiversity Action Plan. Laydown areas of expansion activities should be located	-5										

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					within disturbed soils (anthrosols) to avoid compaction of natural soils.											
					All contractors and subcontractors must receive induction. The induction should be updated on site, to make provision for consideration of the site plan and include a detailed explanation on the purpose of the no-go zones, presence of protected species, presence of the CBA and ESAs and the meeting of the EMPr conditions and requirements..											
					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.											
					All topsoil which is removed should be relocated to the demarcated topsoil stockpiles (in this case Topsoil Stockpile 4). In addition to this the topsoil stockpiles (#3) which will be relocated in the event of Option 2 of the Truck Parking, should be done in a manner as to protect the soils for future rehabilitation purposes.											
					Site clearance and activities should be restricted to the approved footprint. Contractor's and laydown areas should be established on already disturbed footprints.											
					Vegetation clearance and commencement of construction and exploration activities, particularly along the Dwarsrivier system, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					relatively low and less prone to compaction											
			Direct impact: 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.	-13	Adhere to Storm Water Management Plan (SWMP), developed by SWS (2016) or any approved update thereafter. For the exploration activities, the SWMP identified for these activities by the 2018 specialist studies should be adhered to. 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 storm water and wind are anticipated to be low. Note that: Drilling within 1:100 year flood line will be avoided but if unavoidable must be approved by DWS. The footprint of the proposed drilling pads and infrastructure areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically	-6	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation. Protect the soil resources within the Mining Right Area.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation.	x			x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept.	Independent ECO and SHEQ Department	SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.

Name of Activity			Potential Impacts		Mitigation Type					Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					possible. This will be specifically important to protect any SCC species.											
					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.											
					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.		Retaining soil integrity for rehabilitation.	Maintaining soil integrity, with successful vegetation establishment.	x			x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements.	Independent ECO and SHEQ Department	SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.
					The mine will ensure that erosion controls are included in the designs of all linear infrastructure (roads, conveyors, low level bridge crossing, pipelines or open channels).											
	1, 2 (Truck Parking, Laydown, Topsoil Stockpile, Low Grade Stockpile, Roads), 3 (North Mine undergroun d supply	Terrestrial Ecology (Fauna & Flora)	A number of impacts have been identified as part of the ecological specialist study: • Site clearing and the removal of vegetation leading to a loss of sensitive floral habitat; • Excavation of soils leading to increased runoff and sedimentation of downslope habitat; • Dust generation during construction leading to a loss of floral habitat; • Runoff/disposal of concrete and construction materials from the layout areas into the surrounding habitat leading to surface hardening and limiting	-13	Adhere to the measures presented under soil impacts.	-5	Limit the impact of the mining operation on the Ecological Setting of the area.	No unlawful removal of floral SCC, including protected tree species should take place. Initiate rehabilitation of disturbed areas once the construction phase has been completed. Successful self-succession to be achieved. Eradication of alien and invasive species within the project footprint areas.	x			x	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. Develop a site layout indicating all no go zones (in terms of the freshwater and aquatic assessment, ecological assessment and	Independent ECO and SHEQ Department.	Map development: Immediately. Floral Rescue and Relocation Plan: Planning Phase Monitor vegetation establishment and relocation: ongoing SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. Training; Annually BAP update: Annually
					Adhere to the measures presented under hydrological impacts (especially by implementing storm water management measures).											
					Adhere to the management measures presented for air quality management.											
					Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities.											
					No drill pads are to be located within any freshwater systems or their associated buffer zones, this will ensure the continued protection of these systems and the species they support											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			recruitment of new vegetation; • Loss of floral diversity through invasion of alien species in disturbed areas; • Movement of construction vehicles and access road construction through sensitive floral habitat; • Compaction of soils reducing efficiency of floral re-establishment; and • Increased fire frequency during construction leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted for the Capital Projects: • Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld: Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated). The following significances should be noted for the Drilling Projects:		through habitat and resource provision. Vegetation clearance and commencement of construction activities should either be scheduled to coincide with low rainfall conditions when erosive storm water is anticipated to be limited or alternatively storm water controls must be established at the start of construction and dust suppression implemented. As far as possible drill pads should be accessed through the existing road network The optimised footprint areas of the drill pads are to remain as small as possible and vegetation clearing must to be limited to what is absolutely essential and vegetation outside of the footprints is not to be cleared. This is specifically important to to avoid protected tree species and trees such as *Vitex obovata* subsp *wilmsii* which provide a food resource for threatened cicadas *Pycna sylvia*. During the surveying and site-pegging phase of the proposed mining activities, all floral Species of Conservation Concern (SCC) that will be affected must be marked and where possible, relocated (if possible and to be identified by a qualified ecologist) to suitable habitat surrounding the disturbance footprint. The relevant permits must be applied for within the relevant province as indicated in the baseline floral assessment, prior to the construction phase. Clearing of vegetation should take place in a phased manner as to keep bare soil areas as small as possible to limit the erosion potential. Should any floral species protected under the Limpopo Environmental Management Act (LEMA) (Act 7 of 2003) and National Forests Act (Act 84 of 1998) be encountered within									hydrological assessment). Environmental Awareness training must be provided to employees. A suitable floral rescue and relocation plan should be developed and overseen by a suitably qualified specialist or nominated mine personnel in order to ensure that species loss during construction activities is kept to a minimum. Permits for threatened/ protected plant removal or relocation must be in place. Monitor success of any rescued relocated plants. Annual update of the BAP.		

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			• Sekhukhune Mountain Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat: (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium Low if unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species diversity):		the proposed development footprint areas, permits should be obtained from LEDET and DAFF to remove, cut or destroy such species before construction of infrastructure takes place. Prior to the removal/ relocation of floral SCC, the mine should appoint an ecologist to monitor and oversee such activities, which may only take place under necessary permits. All such species should be demarcated by signage or tape prior to removal/ relocation and include species in the vicinity of activities which are to be avoided. If possible, vegetation clearance and commencement of construction activities can be scheduled to coincide with low rainfall conditions when erosive storm water and windy conditions are anticipated to be low. 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 and to minimise soil erosion and dust emission. No collection of firewood, floral SCC or medicinal floral species must be allowed by construction or mining personnel. 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										

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			Very Low if unmanaged, and Very Low if mitigated); Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).		approved footprint. Contractor's camps and laydown areas should be established on already disturbed footprints. All employees, or contractors on site, involved in the proposed projects, should receive a detailed induction on the expectations for the protection of fauna and flora on site. Alien and invasive floral species management and eradication should be implemented on site.											
			Direct impact: Displacement of faunal species and human/animal conflict. Due to the fact that the Capital Projects area 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 field site. Impacts may however occur around the Truck Parking areas and Exploration areas, which is less disturbed.	-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. Note that in the event that that any protected species (Faunal SCC) are observed or identified, activities in such area should cease immediately and an ecologist must be contacted to assess the site and required measures.	-6	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved. No unlawful removal of flora of conservation importance should take place. No Poaching, hunting, killing of any faunal species may take place.	x			x	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. Records of Incidents should be kept on site and all employees should be made aware of the use thereof.	Independent ECO and SHEQ Department	Monthly reporting on animal fatalities. ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring. Training; Annually
			Direct impact: Loss of ecological connectivity and ecosystem functioning - most importantly around Project 1.	-15	No construction or project related activities may be undertaken outside of the demarcated areas.	-7	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved.	x			x	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to	Independent ECO and SHEQ Department.	SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.

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														determine whether activities on site are undertaken in accordance with the EMPr requirements.		
					The construction area should, if possible, be isolated by means of a chain link fence or demarcation tape in order to prevent animals entering the area and being killed. All areas, especially with the exploration activities, should be rehabilitated once construction has been completed, and in the case with the drilling pads, once the drilling activities at each pad have been concluded. In the establishment of fences, erect fences in such a manner as to limit the potential of animals to enter active mining areas. This could involve the placement of rocks and materials at on the surface of the fences.								Restriction of access.	The Project Manager should implement the necessary design concepts to limit the impact on the ecological connectivity and functioning of the ecosystem.	Project Manager	As part of the project design. Prior to construction.
			Loss of faunal habitat, species and faunal SCC which is more so related to the exploration activities, but should be noted for any developments on site).	-15	Adhere to management measures presented for the vegetation protection. Removal of faunal SCC host plants *Vitex obovata* subsp *wilmsii* is to be actively avoided, where this is not feasible the clearing of such vegetation must be minimised as far as possible. When rehabilitating a footprint site, it is imperative that as far as possible the habitat that was present prior to disturbances is recreated, so that faunal species that were displaced by vegetation clearing activities are able to recolonise the rehabilitated area. Rocky outcrop and sheet rock areas should be avoided so as to minimise disturbance to species such as Sekhukhune Flat Lizard (*Platysaurus orientalis orientalis*) and the subspecies Fitzsimons' Flat Lizard (*Platysaurus orientalis*	-7	Limit the impact of the mining operation on the Ecological Setting of the area.	Zero animal fatality rates should be achieved.	x			x	Limit the impact of the construction on the Ecological Setting of the area.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. A suitable floral rescue and relocation plan should be developed and overseen by a suitably qualified specialist or nominated mine personnel in order to ensure	Independent ECO and SHEQ Department.	Rescue and Relocation Plan: Planning Phase SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.

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					fitzsimonsi) which inhabit these rocky areas.									that species loss during construction activities is kept to a minimum. Procedure should be in place in the event that SCC species are encountered (flora or fauna). The contact details of the ecologist should be available in event of encountering SCC species during exploration activities.		
					Drill pads located within the mountainous areas should be restricted to the lower slopes, so as to avoid the need to cut access roads and drill pads into the steeper mountain sides. This will greatly reduce habitat loss through clearing activities and erosion, whilst minimising the need for extensive rehabilitation activities No drill pads are to be located within any freshwater systems or their associated buffer zones identified as part of the EMPr, this will ensure the continued protection of these systems and the species they support through habitat and resource provision. Drill pads located in open grassed areas near the Klein and Groot Dwars river systems, notably in areas of deeper soil must be searched for any signs of mole activity. Should such be found, a suitably qualified specialist is to be contacted in order to advise on the species likely occurring in the area and the best way forward. During this time, drilling and vegetation clearance is to cease until further instruction by the specialist.								Restriction of access.	The Project Manager should implement the necessary design concepts to limit the impact on the ecological connectivity and functioning of the ecosystem.	Project Manager	As part of the project design. Prior to construction.

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					Removal/ cutting down of large trees (>4m) should be avoided, notably in the riparian areas, valleys between mountain slopes and along the mountain sides, as these are considered important for large raptors, and cannot be readily replaced through rehabilitation. Drill pads should avoid rocky outcrops and areas of sheet rock, as these are primary habitat for SCC such as *Hadogenes polytrichobothrius* (flat rock scorpion). Prior to vegetation clearing activities in the Sekhukhune Mountain Bushveld and Sekhukhune Bushveld habitat, the sites should be inspected for the presence of baboon spider burrows. If located, these species should be carefully excavated by a specialist ensuring no harm to the spider and relocated to similar surrounding habitat outside of the footprint area. Smaller species such as scorpions, amphibians and reptiles are likely to be less mobile during the colder period, as such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and the need for their conservation. Smaller scorpion species and harmless reptiles/ amphibians should be carefully relocated by a suitably nominated construction person or nominated mine official. For larger venomous snakes, a suitably trained mine official should be contacted to effect the relocation of the species, should it not move off on its own.										

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					No hunting/trapping or collecting of faunal species is allowed No informal fires by construction personnel are allowed.											
			Direct impact: The disturbance of the cleared areas may allow the establishment and increased prevalence of alien and invasive vegetation. The fact that the areas cleared for construction creates niches that can be colonised by alien 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.	-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.	-5	Awareness creation on the importance of that natural ecosystem in which the mine operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of alien and invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.	x			x	Invasion of alien and invasive vegetation.	An alien and invasive plant species control/ eradication and management plan must be developed and implemented on site in line with the current monitoring programme. This must be undertaken prior to the implementation of the projects	SHEQ Department and a Specialised Ecologist.	Alien and invasive species monitoring (monthly). Alein and invasive species eradication (annually or as required). Ecological Study (Biodiversity Action Plan) (annually).
			Direct impact: Increased vibration and noise will have a significant effect mainly on fauna species in the immediate vicinity of the development, due to the heavy machinery utilised, and the presence of the activities towards the Springkaanspruit and Dwarsrivier. Direct impact: Vibration can also affect a number of subterranean fauna taxa, such as burrowing mammals, reptiles and arthropods. Vibration affects these animals by causing the collapsing of burrows, and causing these animals to leave the area due to the vibration. Direct impact: Noise will also affect a wide range of taxa including avifauna, mammals, reptiles,	-8	Equipment will be well maintained to reduce excessive noise creation. Activities should remain within the demarcated sites. Activities will be restricted to the day time.	-6	Limit the impact of the mining operation on the Ecological Setting of the area. Remain within the current ambient character of the site.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act. Zero complaints from surrounding landowners regarding noise levels	x			x	Elevated Noise Levels.	Ambient noise monitoring should be undertaken in line with the current mines monitoring programme. Biodiversity Action Plans should be continued and assessed/audited.	SHEQ Department. Ecologist	Once a month (during the day and during the night). Annual assessments and audits.

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			amphibians and arthropods.													
			Direct and Cumulative Impact: 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 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.	-9	Maintain the current air quality monitoring stations that determine fallout and implemented respirable dust (PM10) monitoring that could arise from the mining activities. Implement dust suppression in and around the construction area where required.	-5	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	x			x	National Dust Regulation Compliance.	Dust dispersion will be monitored in line with the current dust monitoring programme.	SHEQ Department	Monthly Monitoring with Annual Reporting.
			Direct Impact: Increased erosion can eventually lead to the further loss of vegetation and habitat for floral and faunal 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, relatively large areas will be cleared before construction leaving these areas prone to erosion.	-16	Ensure the required erosion protection measures are monitored and corrected where necessary. An approved SWMP 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. Vegetation clearance should be limited to what is necessary, specifically in steeper areas and rock outcrops with higher erosion potential. An erosion monitoring and mitigation plan should be put in place around active drainage channels.	-6	Limit the impact of the mining operation on the Ecological Setting of the area. Limited to no presence of erosion gulleys. Retaining soil integrity for rehabilitation.	Maintaining soil integrity, with successful vegetation establishment.	x			x	Soil erosion	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr and SWMP requirements.	ECO and SHEQ Department	SHEQ: Weekly monitoring. Rectification of erosion gulleys should be undertaken immediately upon observation. ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.
	1, 2 (truck parking)	Riparian Habitat & Wetlands	Various non-perennial drainage channels are present in this area. The Richmond Dam is also in close proximity to the	-10	Ensure that the surface infrastructure footprint does not encroach on freshwater resource habitats or the surrounding dams and that	-6	Remain within or approve upon the current Aquatic Health and Water	Maintaine or Improve upon the current aquatic health and water	x			x	Compliance in terms of the current and or future WUL.	Ongoing Biodiversity and water quality assessments.	Aquatic/ wetland Specialist. Environmental Department	Surface water biomonitoring in line with the current

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			drilling activities. This could result in: 8. Potential direct loss of instream, riparian or floodplain habitat. 9. Increased hardened surfaces and compacted soils thus reducing integrity of interflow. 10. Increased surface water runoff, leading to erosion, and sedimentation of freshwater resource habitat. 11. Loss of foraging and breeding habitat for aquatic/wetland-dependent fauna. 12. Proliferation of alien vegetation as a result of disturbances. 13. Sediment-laden runoff entering freshwater habitat leading to altered water quality and smothering of vegetation and changes to aquatic habitat. 14. Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths.		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. Exploration drilling activities must remain outside of the 1:100 flood line and where this is not possible, the required approval must be obtained from the DWS. Exploration drilling activities should further be restrained to the dry season. Exploration drilling should not be permitted within the active channels, floodplain wetland or riparian zones of the systems or within 32m thereof. Access roads for the exploration drilling sites should be limited by utilising existing roads as far as practically possible. Where new roads are constructed the necessary approvals in terms of the NEMA, and Section 21c&i, should be obtained through the LEDET and DWS respectively. Where access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr. Ongoing biomonitoring should be undertaken at the upstream and downstream points along perennial water systems.		Quality baseline conditions.	quality baseline conditions.					Present Ecological State: Assessed watercourses currently considered to be in largely near natural or moderately modified condition. Ecological Importance and Sensitivity: The assessed watercourses currently considered to be of moderate, high to very high EIS.	Develop a time frame for drilling activities and combine this timeframe with a rehabilitation programme to ensure that ongoing rehabilitation is undertaken.		monitoring programme. Monitoring of rehabilitation plan monthly.

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					Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. An SWMP 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. The proposed SWMP included into the EMPr for the drilling pads should be implemented. Implement and maintain alien and invasive vegetation eradication and management programme. Minimise the period in which excavated trenches, foundations etc. remain open, in order to reduce the risk of draining up gradient freshwater systems. 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 form as a result of the formation of preferential flow paths. Access roads and vehicle movement should follow the natural contours of the landscape as much as possible. Ensure that management measures developed by a suitably qualified hydrologist within an approved SWMP and the requirements developed for the drilling pads as per the EMPr are implemented to mitigate against concentration of runoff if deemed necessary.											
	1, 2 (truck parking)	Hydrology	Direct impact: The removal of vegetation can lead to increased surface runoff, which may in turn alter natural surface water flows and increase siltation of	-10	Rehabilitate bare 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	-5	Operate the water management circuit on site to increase mining efficiency and reduce the need	Implement the SWMP on site.	x	x			Compliance in terms of the WUL and the SWMP.	Annual compliance in terms of the designs of the facility and compliance in terms of the WUL	SHEQ Department and Hydrologist	Surface water monitoring in line with the current monitoring programme

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			watercourses as well as pollution control facilities.		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 SWMP 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.		for maintenance of these facilities.							must be undertaken. The water quality (constituents listed in the WUL or future WUL) for the mine must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
	-	Geohydrology	No direct impact during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2 (Truck Parking, Laydown area), 3 (North Mine Underground Supply)	Heritage	Large portions of the study area are characterised by existing mining operations that would have impacted on surface indicators of heritage sites and apart from isolated widely scattered MSA artefacts (of low significance) no archaeological sites of significance were recorded during the survey for the Capital projects and Diesel Storage. In terms of the exploration programme two Iron Age sites were recorded by Stegman & Roodt (2012).	-13	The two heritage sites identified in the area of the exploration project, should be avoided with a 50m buffer zone around the sites. In the event that any other heritage artefacts or graves are encountered during the excavation activities, all activities must cease and the SAHRA should be contacted to determine the way forward before construction may continue. A 100m buffer should be kept around the Dwarsrivier National Monument. The structures identified in the heritage study around the exploration project should be avoided with a 30m buffer zone. 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	-1	Protect heritage resources for future generations.	Ensure that there is a 100% non-occurrence of impacts to heritage resources.	x			x	Presence of archaeological artefacts.	Development of a Heritage Management Plan. Implementation of a Chance Find Procedure during construction. Known graves should be indicated on development plans and avoided. Training of all contractors and responsible parties must be undertaken to ensure that all parties are aware of the need to protect these resources and what to observe for. Daily inspections must be undertaken during the site clearance and excavation phases.	Engineering Department	Ongoing

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					procedures should be put in place as part of the EMPr. A short summary of chance find procedures is discussed below. This procedure applies to the developer'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 developer, 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 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 find and will notify the SAHRA.											

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		Visual	Direct impact: soil stripping and footprint clearance.	-4	Stripping of vegetation and soils should be undertaken within the demarcated areas only.	-3	Retain the aesthetics of the area as far as practically possible.	Design and construction of infrastructure to blend in with the general topography as far as practically possible. No encroachment outside of demarcated areas.	x			x	Retain activities in demarcated areas.	The Project Manager should implement the necessary design concepts to limit the impact on the overall visual environment.	Project Manager	As part of the project design. Prior to construction.
	All	Air Quality	Direct impact: Dust-fallout.	-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, especially with the exploration activities, 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. It must be ensured that topsoil stockpiles are suitable vegetated. Limit site clearance to designated areas.	-5	Recording of dust fall out to determine trends.	Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				x	National Dust Regulation Compliance.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Dust monitoring to be done in line with the current monitoring programme
	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.	-5	Equipment will be well maintained to reduce excessive noise creation. Activities will be restricted to the day time.	-4	Remain within the required Health and Safety Standards.	Remain within the regulated guidelines and limits as required by the Mine Health and Safety Act.	x			x		Adjacent landowners will be informed of the planned dates of the significant land clearance activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place.	SHEQ Department	Ongoing consultation with surrounding landowners. Regulator noise monitoring in terms of Mine Health and Safety Standards.

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	-	Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
Establishment of Surface Infrastructure	1	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2 (Topsoil Stockpile, Low Grade Stockpile)	Topography	During the site clearance activity, the required storm water management systems and shaping of land would have been completed. Therefore, no further impact on the topography is expected.	-9	Activities should be constructed and developed according to the approved design concepts. Note that laydown areas will only be placed in areas which are demarcated for permanent activity or existing disturbed areas to ensure that no additional areas are disturbed.	-5	-	-	-	-	-	-	-	-	-	-
	All	Soil, Land Use and Land Capability	Direct impact: Construction activities with surrounding exposed soil may in turn lead to soil erosion.	-10	Ensure that all design drawings include effective erosion control measures and that these are implemented during the establishment of the infrastructure.	-5	Limit the loss of soils as far as possible and ensure that the integrity remains during stockpiling for the purposes of successful rehabilitation.	The integrity of the soils stockpiled must remain suitable for the purposes of rehabilitation..	x			x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. Erosion protection measures should be implemented and monitored on areas identified. Photographic records of assessments must be kept.	Independent ECO and SHEQ Department	Erosion gulleys should be rehabilitated immediately upon observation. SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken.
					Existing access roads must be used as far as possible. Where additional access roads are required, these should be planned not to run in parallel to the watercourses. All access roads must be planned to access each drill site at 90 degree angle. No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr. The access roads and drilling sites should be inspected regularly for erosion. Ensure the required erosion protection measures are monitored and corrected where necessary. Erosion rills and gullies should be repaired immediately. Causes of erosion should be determined and mitigated, to prevent future erosion of repaired areas.										
					Vegetation established, will be monitored and assessed to ensure that these remain well established.		Retaining soil integrity for rehabilitation.		x			x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr.	Independent ECO and SHEQ Department	SHEQ: Weekly monitoring ECO: Monthly for the construction phase. Thereafter

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements.		annual external audits can be undertaken.
					Areas of construction must be clearly demarcated. No construction or project related activities may be undertaken outside of the demarcated areas.											
					Vegetation clearance and commencement of construction and exploration activities, particularly along the Dwarsrivier system, can be scheduled to coincide with low rainfall conditions when soil moisture is anticipated to be relatively low and the soils are less prone to compaction.								Soil integrity analysis.	Chemical analysis of the fertility of soils	Soil scientist.	Prior to placement of soils.
					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 exiting the site (i.e. grid system or permanently manned personnel to treat soils during periods of refuelling).									The design of the facilities should be implemented in such a manner as to ensure that spills cannot exit contained areas.	Engineering Department	Project Planning
					Where erosion gulley are formed, these will be recorded on the IsoMetrix system for immediate action.								Vegetation Establishment.	Implementation of storm water management systems by a suitably qualified engineer.	ECO, SHEQ Department and Engineering Department	Immediate implementation of storm water management systems as part of

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														The success of self-succession of vegetation.		the construction activities. ECO: Monthly for the construction phase. Thereafter annual external audits can be undertaken. SHEQ: Weekly monitoring Annual GN704 audits.
	-	Terrestrial Ecology (Fauna & Flora)	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2 (Truck Parking and associated roads)	Riparian Habitat & Wetlands	The establishment of activities in close proximately to riparian systems could lead to encroachment of activities.	-10	Activities should be constructed and developed according to the approved design concepts. Direct surface disturbance of the identified high clay content/wetland (i.e. Acardia, Rensburg, Alluvial etc.) soils should be limited within demarcated areas where possible, to minimise the intensity of compaction due to the susceptibility of these soils to prolonged waterlogging conditions (inundation). No new access roads may be constructed to cross the main rivers (Groot Dwars, Klein Dwars, Dwars River and Springkaanspruit). Where unavoidable temporary crossings should be limited to the smaller ephemeral drainage lines and in line with the stormwater and erosion management requirements as stipulated in the EMPr. 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 avoided as far as possible. Re-fuelling of vehicles may only be undertaken in demarcated workshop areas. Activities should not obstruct flow.	-5	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of GN704 and the aquatic monitoring requirements.	Remain within demarcated areas. Construction and maintenance of the infrastructure and erosion controls. Assess aquatic habitat characteristics against baseline conditions.	Engineering Department and Environmental Department and Aquatic Specialist	Ongoing 6 monthly monitoring of the trends in ecological integrity of the Groot Dwars River is recommended for a period of three years, in order to monitor the potential impacts of the activities. Aquatic monitoring biannually at least.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Where possible, existing access roads should be used for monitoring purposes so as to minimise the compaction of soils and loss of both riparian and instream habitat. 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. During monitoring, always use the shortest routes possible so as to minimise disturbance and loss of habitat both instream as well as in the riparian zone. The riparian zone must be monitored for alien and invasive vegetation encroachment and all alien and invasive vegetation must be removed according to an alien vegetation control/ eradication and management plan. Any erosion or gully formation must be identified on an ongoing basis, re-profiled and revegetated accordingly.											
	1, 2 (Truck Parking and associated roads)	Hydrology	The low level crossing at the Exploration activities could impact on the hydrology of the runoff system in storm events. The Exploration Activities could have a further impact on the Richmond Dam if not well managed. The Truck Parking is in close proximity to a storm water channel which leads to the Groot Dwarsrivier.	-12	For the access roads, it is proposed that berms are constructed across the width of the road, at a 30° to 40° angle. Material for the berms can be sourced from the road cuts, depending on the soil type. The berms should extend well beyond the width of the road, particularly on the downslope side, and it should be ensured that runoff is discharged into a well vegetated or stony area, to prevent erosion. The berms should be constructed to be gradual, in order to allow vehicles to easily pass over them, but should not be overtopped by runoff. Berms should be prioritised at the top of steep transitions in the road slope, as well as above drainage line crossings. The conceptual SWMP provided for the project and discussed in the Report	-6	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of GN704 and the water monitoring requirements.	Remain within demarcated areas. Regularly maintain vehicles and keep records of maintenance. Develop a procedure for the daily inspection of drilling equipment and the lock on the use of this equipment in the event where inspections are not passed. The access roads and drilling sites should be inspected on a regular basis. A	Engineering department & Environmental Department and Aquatic Specialist	Daily inspection of drilling equipment. Regular inspection of vehicles. Ongoing 6 monthly monitoring of the trends in ecological integrity of the Groot Dwars River is recommended for a period of three years, in order to monitor the potential impacts of the activities.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					should be implemented (refer to xxxxxx) . No drilling activities may take place within and agreed buffer (DWS to stipulate) between the Richmond Dam and the drilling activities. No drilling may take place in the 1:100 year flood line unless approved by the DWS. Activities should not obstruct flow. Vehicles and activities will be well maintained and operated.									storm water inspection plan must be developed, and should include the following: • Date of inspections; • Recording of issues (erosion, spills, blockages, silted up structures, etc.); • Actions undertaken to address issues; • Time taken to address issues; and • Photographs post action taken. Construction and maintenance of the infrastructure and erosion controls. Assess aquatic habitat characteristics.		
	2, 3	Geohydrology	Direct impact. The use of discard rock in the compaction of the roads and surface footprints should not lead to an impact on the groundwater resources as the material is not considered a pollutant. According to Ivusi [Ivusi 2009] the outcome of acid-base accounting (ABA) leach tests results undertaken on tailings and discard rock samples at Dwarsrivier in 2006 was that the material is relatively inert.	-9	The use of discard rock will only be undertaken when an alternative such as paving proved to be economically unviable. Exemption in terms of GN704 (Regulation 5) should be obtained from the DWS for the use of the discard rock in the construction of the proposed activities. Groundwater monitoring should be undertaken to ensure that the facilities are operated in manner as not contributed to the current and historic pollution plumes.	-5	Remain within or approve upon the current groundwater quality.	Improve upon the current groundwater quality.	x			x	Groundwater pollution and potential trends.	Cost benefit analysis should be undertaken to ensure that the best road surfaces and compaction material are being used. Groundwater monitoring will be undertaken as per the current groundwater monitoring network on site. Application for GN704 Regulation 5 should be	SHEQ Department & Engineering Department	Application for GN704: To be undertaken as part of WUL Consolidation Project. Cost benefit analysis, prior to construction. Groundwater monitoring: As per current monitoring network.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														obtained prior to construction.		
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
	1	Visual	Direct impact: Establishment of infrastructure, especially the exploration roads along the mountainous area.	-11	Activities should be restricted to within the approved footprints. The roads should follow natural contours as far as practically possible. Drilling activities should be restricted as far as practically possible to the lower lying areas and not on steaper slopes or rocky outcrops. Roads should only be constructed where absolutely necessary with the least amount of vegetation clearance possible. Once exploration has been completed in an area, the roads should be rehabilitated.	-7	Retain the aesthetics of the area as far as practically possible.	Design and construction of infrastructure to blend in with the general topography as far as practically possible. No encroachment outside of demarcated areas.	x			x	Remain within demarcated areas.	The Project Manager should implement the necessary design concepts to limit the impact on the soil resources and ecological connectivity and functioning of the ecosystem in order to minimise impacts on the overall visual environment. Avail a map to all project parties detailing the approved location of all infrastructure.	Project Manager and SHEQ Department	As part of the project design. Prior to construction.
	-	Air Quality	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	Noise	All impacts are assessed under Footprint Clearance.	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	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	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3	Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
	1, 2, 3	Soils	Contamination of soil resources due to hydrocarbon spills.	-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 contaminated material at the drill pads as part of the exploration activities must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur. All fuels and soils must be stored in appropriate containers.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil Pollution Prevention	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format,	SHEQ Department	SHEQ: Weekly monitoring. ECO: Annual external audits can be undertaken.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with Safety Data Sheets (SDS) requirements.									issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
					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.									Ensure that a Hydrocarbon Management Procedure and Spill Prevention and Emergency Spill Response Plan is available on site and updated regularly.	SHEQ Department	Regular update in terms of procedure requirements.
					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.		Awareness creation on site regarding duty of care and waste management.							Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
					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	-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.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x	Soil Integrity	Contracts must be in place for the provision of chemical toilets where required. Removal companies must have the necessary	SHEQ Department	Daily internal inspections. Annual review of supply and removal companies' contracts and permits.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														contracts and permits in place.		
	1, 2, 3	Ecology	The unmanaged disposal of waste could result in the spread of invader species, as well as the influx of opportunistic species.	-12	Develop dedicated waste handling areas, prevent access to rodents and opportunistic species, and prevent the spread of waste. Develop dedicated waste handling areas, fit for purpose and prevent the spread of waste.	-5	Proper waste management practices on site.	No unlawful disposal of waste. Registration of all waste handling and/or storage areas on site.	x			x	Ongoing Rehabilitation	Ongoing waste classification and management processes to be implemented. Updated waste inventory to be available on site. Waste Management and Handling Procedure to be available on site and updated regularly.	SHEQ Department	SHEQ: Weekly inspections. Regular update in terms of procedure requirements. Waste Classification of Waste Rock every five (5) years.
		Riparian Habitat and Wetlands	Various non-perennial drainage channels are present in this area. The Richmond Dam is also in close proximity to the drilling activities.	-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 it must be ensured that all waste is removed to an appropriate disposal facility. Ongoing biomonitoring should be undertaken at the upstream and downstream monitoring 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.	-5	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the current and future WUL.	Ongoing Biodiversity and water quality assessments. Demarcation on site of all activities to be undertaken. Develop a procedure and schedule for the exploration activities in terms of the wet and dry seasons.	Aquatic Specialist.	Weekly inspection of the location of drilling sites. Quarterly review of the drilling schedule in line with climatic considerations. Surface water biomonitoring in line with the current monitoring programme.
	1, 2 (truck parking)	Surface Water	Handling of Hazardous Waste within workshops and general mine area could contaminate the dirty water storage areas.	-11	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter, including the	-6	Protect the integrity of the Storm Water	Implement the SWMP on site.	x				Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ department	SHEQ Department	Assessments: Weekly. Monitoring: As per

Name of Activity			Potential Impacts		Mitigation Type						Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			The water is then reused in the system and could have impacts on the integrity of the storm water system and also the production.		recommendations as per this EMPr.		Management System.							should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The water quality (constituents listed in the WUL)(current or future) must be monitored and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory. An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as WUL approved (current or future) and Environmental Authorisations.		approved WUL or future WUL Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements as and when required..
					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.											
					All contaminated material at the drilling sites associated with the exploration activities must be contained in mobile sumps. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur.			Aim to achieve a zero-spill record.				x				
					Hazardous waste handling should only take place within bunded and/or lined areas.			Maintain a 100% safe disposal record on the disposal of hazardous waste.				**x**				
					Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site.			Provide training to all staff on best practices regarding waste management every year.	**x**			**x**				
					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.											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			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.	-9	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter, including the recommendations as per this EMPr. 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 licenced facilities. Recycling practices must be investigated and implemented on site.	-5		Maintain a 100% compliance with the conditions of the NEM:WA Permit on site for the Salvage Yards.	x			x				
	1, 2, 3	Groundwater	Large scale hydrocarbon spills could be present at the mining area	-12	Clean and Dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter, including the recommendations as per this EMPr. No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area. 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 (LDEDET, Catchment Management Agency (CMA)/DWS).	-6	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the Itegrated Water and Waste Management Plan (IWWMP). Implement the SWMP on site. Aim to achieve a zero spill record.	 x x	x		x x	Groundwater pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised	SHEQ Department	Assessments: Weekly. Monitoring: As per approved WUL.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					All equipment and machinery should be kept in good working order.									system. Analysis of results must be undertaken by an accredited laboratory.		
					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.	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-6	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the IWWMP.		x		x	Groundwater pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The groundwater quality (constituents listed in the WUL (approved)) must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Site Assessments: Weekly. Monitoring: Quarterly (during construction). Biannually (after construction)
					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.			Maintain a 100% safe disposal record on the disposal of hazardous waste.	x			x				
					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 licensed removal company and taken to a suitable and licensed landfill site.											
					Documentation of removal and safe disposal must be available on site.											
			Handling and Storing of Domestic Waste	-7	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-5		Achieve 100% compliance with the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the IWWMP.		x		x				
					Waste management training must be implemented on site.											
					Clear signs informing staff of waste management practices must be implemented on site.			Maintain a 100% compliance with the conditions of	x			x				
					All waste must be removed by licensed contractors and											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	LOM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					disposed of at a licensed landfill site.			the NEM:WA Permit on site for the Salvage Yards.								
					As a duty of care and the cradle-to-grave principles, the mine should regularly inspect disposal sites to ensure that best practices are implemented.											
					Recycling practices must be investigated and implemented on site where practical.			Maintain a 100% accurate recording of waste and submission of such recording to the Department.	x			x				
					Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the site activities can be detected.			Maintain daily covering of the landfill site.	x			x				
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 69: Impacts to be mitigated in their respective phases (Operational Phase)

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Operational Phase																
Exploration Drilling Activities	1	Geology	Impact on Mining operations of applicant as well as Two Rivers Platinum Mine.	-13	Early consultation to determine the requirements of both parties.	-4	Maintain good relationship with surrounding mines.	Remain within approved and agreed upon footprints.	x			x	Continuation of economic activities in the area.	Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Manager.	Quarterly, and more regularly if required.
					An open channel of consultation must be maintained throughout the process.			Remain within approved agreements.						Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department.	Quarterly
					Where conflict arise the DMR must be involved			Comply with EMPr and Mine								

Name of Activity			Potential Impacts		Mitigation Type						Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					to facilitate consultation processes.			Health and Safety Act (Act No. 29 of 1996) (MHSA) requirements								
		Topography	No impact foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Contamination of soils due to the presence of contaminants.	-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).	-7	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil Pollution Prevention	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	SHEQ: Weekly monitoring. ECO: Annual external audits can be undertaken.
					All contaminated material at the drilling sites/ exploration activities must be contained in mobile sumps. These must be of an adequate size to contain runoff from the drilling sites. The water levels within the sump must be inspected regularly, and dirty water removed to allow adequate freeboard at all times. The mobile sumps must maintain a suitable freeboard, to ensure when these are moved/ transported, that no spillage will occur.									Ensure that a Hydrocarbon Management Procedure and Spill Prevention and Emergency Spill Response Plan is available on site and updated regularly.	SHEQ Department	Regular update in terms of procedure requirements.
														The mobile sumps to be used for the drilling activities must be sized to contain the volumes of water which will be derived from the drilling activities.	Engineering Department	Prior to the commencement of the drilling activities.
														An incident reporting	SHEQ Department	Reporting of incidents in terms

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					The mobile sump should be placed at the lowest but closest point to the drilling site, to ensure that all dirty water from the site drains towards the sump.									procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.
							Awareness creation on site regarding duty of care and waste management.							Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
			Contamination of soils as a result of a lack of sanitary services	-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.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x	Soil Integrity	Contracts must be in place for the provision of chemical toilets where required. Removal companies must have the necessary contracts and permits in place.	SHEQ Department	Daily internal inspections Annual review of supply and removal companies' contracts and permits.
		Vegetation	A number of impacts have been identified as part of the ecological specialist study: - Site clearing and the removal of vegetation leading to a loss of sensitive floral habitat; - Excavation of soils leading to increased runoff and sedimentation of downslope habitat; - Dust generation during construction leading to a loss of floral habitat;	-11	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 importance thereof. When accessing the drill pads, vehicles are to utilise the existing roads. Continually monitor the operational activities of	-5	Awareness creation on the importance of that natural ecosystem in which the mine operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance	Eradication of alien and invasive species within the project footprint areas. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of	x			x	Environmental Awareness	Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.

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			• Runoff/ disposal of concrete and construction materials from the layout areas into the surrounding habitat leading to surface hardening and limiting recruitment of new vegetation; • Loss of floral diversity through invasion of alien species in disturbed areas; • Movement of construction vehicles and access road construction through sensitive floral habitat; • Compaction of soils reducing efficiency of floral re-establishment; and • Increased fire frequency during construction leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted for the Capital Projects: • Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC		the drill pads ensure that further disturbance of the surrounding habitat is not occurring. Ensure that no unnecessary clearing of floral habitat occurs. Following heavy rains, drill pads and access roads are to be inspected for signs of erosion, which if found, must be immediately rectified through appropriate erosion control measures. No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary system will be developed for any person not complying			disturbed areas within one year of final activity.							

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Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			(low if unmanaged, very low if mitigated). The following significances should be noted for the Drilling Projects: • Sekhukhune Mountain Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium Low if unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and											

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			Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species diversity): Very Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).													
		Wetlands and Riparian Habitat	Operation of drilling activities within flood line areas. The following impacts were identified: 1. Possible contamination of surface water, leading to impaired water quality and contamination of soils within freshwater resource areas. 2. Sedimentation of freshwater resources could lead to altered water quality, altered channel competency and altered vegetation community composition. 3 Potential for further erosion and sedimentation of freshwater resources, leading to altered channel competency and altered vegetation community composition. 4. Altered runoff peaks leading to changes in the hydrological regime on a localised scale.	-12	Drilling must not take place within the active channels, delineated floodlines or steep riparian zones associated with the freshwater resources or within 32m thereof. Drilling activities will not take place within the 1:100 year flood line. A spill prevention and emergency spill response plan should be compiled to guide the construction works; and an emergency response contingency plan should be put in place to address clean-up measures should a spill and/or a leak occur.	-6	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the current WUL. Remain within demarcated areas.	Ongoing biomonitoring and water quality assessments. Demarcation on site of all activities to be undertaken. Develop a procedure and schedule for the exploration activities in terms of the wet and dry seasons requirements.	Aquatic Specialist	Weekly inspection of the location of drilling sites. Quarterly review of the drilling schedule in line with climatic considerations. Surface water biomonitoring in line with the current monitoring programme.
		Hydrology	The Exploration activities could impact on the hydrology of the runoff system in storm events. The Exploration Activities could have a further impact on the Richmond Dam is not well managed.	-12	No drilling activities may take place within 100m of the Richmond Dam. No water may be abstracted from watercourses, without the necessary approval by the DWS. Measures to contain and reuse as much water as possible within the mine process water system should be	-6	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the current WUL. Remain within demarcated areas.	Ongoing Biodiversity and water quality assessments. Demarcation on site of all activities to be undertaken. Develop a procedure and schedule for the exploration activities in terms of the wet and dry	Aquatic Specialist	Weekly inspection of the location of drilling sites. Quarterly review of the drilling schedule in line with climatic considerations. Surface water biomonitoring in line with the

Name of Activity		Potential Impacts			Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					undertaken. Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised. The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment. Vehicles and activities will be well maintained and operated.									season requirements.		current monitoring programme.
		Geohydrology	Unlawful abstraction of groundwater and the contamination of groundwater.	-12	Exploration drilling must be undertaken by a reputable company and each exploration borehole site must be adequately supervised by a Dwarsrivier Mine representative. All personnel involved in the exploration programme must receive adequate training regarding the groundwater management programme, spill procedures, use of oil spill kits and rehabilitation of exploration boreholes before work commences. The area to be disturbed must be kept to a minimum, not exceeding 20m x 20m. Exploration drilling must not take place on the alluvial aquifer, as it is vulnerable to surface sources of contamination. A drip tray or similar containment measure must be placed	-5	Remain with the conditions of the WUL.	Protection of groundwater resources.	x			x	Compliance in terms of the current WUL. Remain within demarcated areas.	Ongoing groundwater monitoring. Induction with the view on creating environmental awareness.	SHEQ Department and HydroGeologist	Weekly inspection of the location of drilling sites. Groundwater monitoring quarterly. Quarterly review of the drilling schedule in line with climatic considerations.

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					underneath the drilling rig to contain oil and diesel spills. Only biodegradable drilling fluid must be used during exploration drilling. A chemical toilet must be used on site during exploration drilling. Full or leaking toilets must be reported to the Supervisor for corrective action or replacement. Sediment and erosion controls must be designed to contain possible dirty runoff within the drilling pad. This will be achieved with the portable bunding that will be installed around each drilling pad. Spills must be managed according to a formalised Spill Procedure. Any contaminated soil must be collected into non-permeable bags and disposed of to an approved disposal facility. For the purpose of future monitoring programmes, impact assessments and rehabilitation, the depth of water strikes must be recorded during exploration drilling. The static groundwater level must be monitored in each exploration borehole after completion and before rehabilitation for future monitoring, impact assessment and rehabilitation purposes. No water may be abstracted from groundwater resources											

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					without the necessary approval by the DWS. Measures to contain and reuse as much water as possible within the mine process water system should be undertaken. Very strict control of water consumption and detailed monitoring must take place, and all water usage must continuously be optimised. The mine's water balance must be strictly controlled at all times to ensure optimal water use, prevent overflow in dirty storm water management systems and prevent spills to the environment. No maintenance may be undertaken outside of approved workshop areas.											
		Air Quality	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	Direct impact: Establishment of infrastructure, especially the exploration roads along the mountainous area.	-11	Activities should be restricted within the approved footprints. The roads should follow natural contours as far as practically possible and should be constructed with the aim of rehabilitation practices in mind. Roads should only be constructed where absolutely necessary with the least amount of vegetation clearance possible. Once exploration has been completed in an area, the roads should be rehabilitated.	-7	Retain the aesthetics of the area as far as practically possible.	No encroachment outside of demarcated areas.	x			x	Protect the long-term aesthetics of the area.	Roads should be demarcated on Exploration Maps, which should include the topographic lay of land. Avail a topographic map indicating the location of all drilling sites and the best access road locations for these. Inspection on the establishment of the roads during the operational phase should be undertaken.	Engineering Department and SHEQ Department	Demarcated Map to be developed prior to the establishment of drilling sites. Weekly inspections of the location of the drilling sites. Rehabilitation plan of roads should be developed with timeframes prior to the establishment of the drilling sites. Dust monitoring: Monthly

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		Landowner Relationships	Unlawful access to land or mining activities	-13	Early consultation to determine the requirements of both parties.	-4	Maintain good relationship with surrounding mines.	Remain within approved and agreed upon footprints.	x			x	Continuation of economic activities in the area resulting from the powerline.	Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Manager	Quarterly, and more regularly if required.
					An open channel of consultation must be maintained throughout the process.			Remain within approved agreements.						Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department	Quarterly
					Where conflict arises, the DMR must be involved to facilitate consultation processes.			Comply with EMPr and MHSA requirements								
		Socio-Economic	Unlawful and unscheduled access.	-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.	-5	Maintain good relationship with surrounding mines.	Approved operating procedures, safety files and communication structure and compliance thereto.				x	Continuation of economic activities in the areas associated specifically with exploration drilling activities. Compliance with Health and Safety Requirements. Compliance with Environmental Authorisations.	Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Manager	Quarterly, and more regularly if required.
					All activities should remain within the approved contracts.									Development of COPs and Health and Safety Requirements.	SHEQ Department to coordinate	Immediately
					A list of contact people and responsible parties should be finalised.		No impact on economic activities in the area.	Good relationship with surrounding mines.						Monitor the implementation of the Operating procedure during the exploration drilling phases.	SHEQ Department	Quarterly
Operation of the Product Stockpile	2	Geology	No direct impact. Impacts are addressed during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	The ongoing development of the Plant Stockpile will result in an ongoing change in the topography.	-7	The slopes of the Product Stockpile should be developed and managed in such a manner that the facility remains within the contained footprint and at a stable slope.	-5	Operating within approved EMPr conditions and footprints.	Meeting final land use objectives, by operating stable mining infrastructure (Low-Grade Product Stockpile).				x	Remain in demarcated stockpile footprint area.	Ensure that the bunded area for the Low-Grade Product Stockpile is designed to make provision for times when demand outweigh supply. The capacity of the facility should be monitored and managed to ensure that no	Engineering Department and SHEQ Department	Stockpile Design: Immediately Capacity monitoring: Daily. Inspection: Monthly Surface Water Monitoring: In line with approved WUL. GN704 Compliance: Annually
					The Product Stockpile should be located within the existing demarcated footprint area.											

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														overflows are present.		
		Soils	The unmanaged disposal of material and the overflow of product from the demarcated areas could result in an impact beyond the designated footprints.	-13	Stockpiling of product should take place within the demarcated areas.	-5	Proper and planned stockpiling of Product.	No exceedances in disposal beyond the approved footprints.		x		x	Compliance in terms of approved footprint.	The capacity of the facility should be monitored and managed to ensure that no overflows are present.	Engineering Department and SHEQ Department	Stockpile Design: Immediately Capacity monitoring: Daily. Inspection: Monthly Surface Water Monitoring: In line with approved WUL GN704 Compliance: Annually
			Contamination of Soils.	-11	Ongoing maintenance around transfer points should be undertaken. Any spills of product around the conveyor systems should be collected and taken to designated stockpile areas.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil pollution	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	Daily internal inspections. Recording of incidents when occurring. Annual External Audit.
		Ecology	The unmanaged disposal of and the overflow of product from the demarcated areas could result in an impact	-13	Stockpiling of waste and product should take place within the demarcated areas.	-5	Proper and planned stockpiling of Product.	No exceedances in disposal beyond the approved footprints.		x		x	Compliance in terms of approved footprints.	The capacity of the facility should be monitored and managed to ensure that no	Engineering Department	Capacity monitoring: Daily. Surface Water Monitoring: In line

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			beyond the designated footprints.											overflows are present.		with approved WUL. GN704 Compliance: Annually
			Presence of alien and invasive species could impact on the natural succession of vegetation around project infrastructure.	-11	A search must be undertaken prior to clearance for indigenous plants that can be carefully removed and stored for rehabilitation. 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. Compile list of protected and threatened/ Red Data Listed species and compile a relocation programme. The plan for vegetation clearance, must be developed and implemented prior to site clearance. Seeds of indigenous plants must also be collected during the clearance activities where practical. All employees, or contractors on site, involved in this project, must undergo an induction prior to construction where they will be made aware of the footprint, prohibited areas and the importance of compliance with management measures, as well as	-5	Awareness creation on the importance of that natural ecosystem in which the mine operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance philosophy.	Eradication of invasive species within the mining area footprint. Successful self-succession to be achieved. 100% compliance to remain with approved footprint areas. Initiate rehabilitation of disturbed areas within one year of final activity.		x		x	Proliferation of alien and invasive vegetation.	A weed eradication plan must be implemented on site. This must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and a Specialised Ecologist.	Weed monitoring (monthly). Weed eradication (annually or as required). Ecological Study (annually).

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					potential penalties for noncompliance. No open fires must be allowed. Vegetation clearance must be limited to within the footprint area. An alien and invasive plant species control/eradication and management programme must be implemented on site and enforced. This programme must stipulate the monitoring plan, which should include: capturing of areas where alien and invasive species are present and action plan to remove these and % successful removal).											
		Riparian Habitat and Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Groundwater	Stockpiling of material onto the surfaced (cemented) product stockpile.	-8	The groundwater monitoring programme must be implemented and undertaken in accordance to the approved WUL of the mine (current and or future). The product should be stockpiled within a contained facility, no material to be stored on unsurfaced areas.	-7	Remain within the current baseline groundwater conditions.	Improve of the current baseline groundwater conditions.	x			x	Remain within designed capacity.	The capacity of the facility should be monitored and managed to ensure that no overflows are present.	Engineering Department.	Capacity monitoring: Daily
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	Wind erosion from Stockpiles may produce fugitive dust.	-9	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Ensure that the necessary dust suppression is implemented at transfer points on the	-6	Stable Product Stockpile Designs and effective dust suppression.	No exceedances in terms of dust emissions.				x	Compliance in terms of Dust Regulation limits.	Effective management of transfer points and wet suppression techniques. Ongoing dust monitoring.	Engineering Department and SHEQ Department.	Inspection on effectiveness of transfer points: Daily Dust monitoring: Monthly

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					conveyor if found necessary during dust monitoring studies. Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)].											
		Visual	Fugitive dust emissions during stockpiling may have a negative impact on the visual characteristics of the area.	-5	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities. Ensure that the necessary dust suppression is implemented at transfer points on the conveyor if found necessary during dust monitoring studies. Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)]. The Product Stockpile should form part of the overall layout of the existing plant to minimise the additional visual impact.	-5	Stable Product Stockpile Designs and effective dust suppression.	No exceedances in terms of dust emissions.				x	Compliance in terms of Dust Regulation limits.	Effective management of transfer points and wet suppression techniques. Ongoing dust monitoring.	Engineering Department and SHEQ Department.	Inspection on effectiveness of transfer points: Daily Dust monitoring: Monthly
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	The demand for chrome has increased globally due to the increase in China Markets. Not allowing the expansion of Plant Product Stockpile and optimising the logistics around the mining	-16	The approval of the project will allow the mine to continue with logistically sound operations in a long term.	15	Ongoing chrome supply into the market.	Zero cessation of mining activities.				x	Economic Growth and Investment. Operating facilities in and environmentally lawful manner.	Obtain approval for this project in terms of all environmental authorisations.	SHEQ Department and Engineering Department	Monthly follow up with the DMR to obtain feedback on the Environmental Authorisation.

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			operation may result in a restriction on the volume of this material to be produced. This will result in restricting the mine to market supply available reserves and could impact on the economics of scale of the mining operation. The formalisation of the infrastructure on site is undertaken for the optimal operation of activities on site.											Optimise the Mining Works Programme through ongoing exploration activities.		Annual Performance Assessments. Annual assessment the Mining Works Programme and Exploration Programme
		Geology	No direct impact. Impacts are addressed during the construction phase.	-	-	-	-	-	-	-	-	-	-	-	-	-
Truck Parking, Roads and Transportation	1, 2	Soil	Contamination of Soil due to hydrocarbon spills	-11	Vehicles and machinery will be regularly maintained. Maintenance programmes will be established and implemented.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil Pollution Prevention	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr Requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	SHEQ: Weekly monitoring. ECO: Annual external audits can be undertaken.
					No refuelling of trucks may be undertaken in the truck parking area, but only in designated refuelling's areas on site.									Ensure that a Hydrocarbon Management Procedure and Spill Prevention and Emergency Spill Response Plan is available on site and updated regularly.		Regular update in terms of procedure requirements.

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					If necessary, the polluted soils will be remediated and affected areas rehabilitated.									An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.
					All transportation companies will be informed of the requirements in terms of well-maintained trucks and any fines associated with non-compliance.									A Truck Parking Operational Plan must be developed and signed by all transportation companies in which the safety, operational and environmental requirements are stipulated.		Truck Parking Operational Plan developed prior to the operation of the site.
					Should trucks arrive on site, not on standard in terms of maintenance these may not be allowed access to site.									A penalty system must be developed for non-compliance.		Signing of Truck Parking Operation Plan prior to site access.
														Clear signage must be erected on site detailing: Responsible persons and contact details; Truck requirements (i.e. spill kits, tarpaulins, etc.); Incident reporting procedures; Location of spill or absorption kits.		Signage to be erected as part of construction phase.
					Spill and absorption kits must be available and readily accessible at the truck parking. There should always be a									Induction with the view on creating environmental awareness.		Start of each visit for contractors.

Name of Activity			Potential Impacts		Mitigation Type						Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					spare kit available at any given time.											Annually for permanent staff.
					Operators at the truck parking area, must be trained in the: - Use of spill kits; - Emergency preparedness programme; - Incident reporting procedures; - Hydrocarbon management.		Awareness creation on site regarding duty of care and waste management.							Strick operation procedures must be implemented.	Engineering Department	Ongoing
		Vegetation	The specialist studies identified the following impacts: - Potential ineffective rehabilitation post construction leading to proliferation of alien and invasive plant species in the disturbed areas. - Potential erosion stemming from bare soil areas leading to sedimentation of downslope floral habitat. - Risk of discharge and contamination from proposed mining activities may pollute the receiving environment leading to altered floral habitat. - Development beyond the demarcated areas resulting in additional floral habitat loss. - Additional pressure on floral habitat by increased human populations associated with the proposed mine leading to a loss of floral habitat. - Dust generation during operational activities leading to a loss of floral habitat.	-11	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 importance thereof. No open fires must be allowed. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary system will be developed for any person not complying.	-5	Awareness creation on the importance of the natural ecosystem in which the mine operates. Rehabilitation of disturbed areas with indigenous vegetation. Smallest possible area of disturbance	Eradication of invasive species within the mining area footprint. Successful vegetation establishment to be achieved. 100% compliance to remain with approved footprint areas.	x			x	Environmental awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.

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			• Increased fire frequency during operation leading to a loss of sensitive floral habitat. Impact significance has been combined in this table. According to the specialist report the following significances should be noted: • Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated).													
		Ecology	The establishment of alien and invader plant species.	-13	An alien and invasive species control/ eradication and management programme will be developed and implemented to eradicate alien and invasive plants and to prevent new invasions during the ongoing mining operation.	-5	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of alien and invasive species by 90% on site.	x			x	Proliferation of alien and invasive species.	An alien and invasive species control/ eradication and management plan must be implemented on site. Alien vegetation control must be undertaken prior to the growing season. An ecological study should be undertaken to determine the status of revegetation on the site especially around the	SHEQ Department and a Specialised Ecologist.	Alien and invasive species monitoring (monthly); Alien and invasive species eradication (annually or as required); Ecological Study (annually)

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														rehabilitated areas.		
					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.											
			Accidental death of animals on the roads.	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings.	-10	Awareness creation on the importance of that natural ecosystem in which the mine operates. Implementation of safe operation practices.	Zero animal fatality.	x			x	Creation of awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
					A clearly marked and enforced vehicle speed will be implemented on the internal mine and transportation routes.									Clear signage must be erected on site.		Signage to be erected as part of construction phase.
					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.											
		Riparian Habitat and Wetlands	Various non perennial drainage channels are present in this area. The Truck Parking access road in particular will be located in close proximity to this drainage channel.	-12	The truck parking itself should remain at all times outside of the 1:100 year flood line of the watercourses unless approved in terms of the necessary legislation. Ongoing biomonitoring/ surface water monitoring should be undertaken at the upstream and downstream points along perennial water systems/ identified monitoring points.	-5	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the approved WUL.	Ongoing biomonitoring and water quality assessments.	Aquatic Specialist.	Surface water biomonitoring in line with the current monitoring programme.

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					Trucks should be well maintained, and any truck not in proper condition which could impact on the watercourses or hydrological system of the site should be subjected to a warning system and fines. Approved SWMPs 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.											
		Surface Water	Contamination of surface water resources. There are no surface water resources in the area, however, the natural runoff, which must be managed internally on site could become impacted.	-9	Clean and dirty water separation systems should be maintained.	-5	Operate the site to limit the presence of spills.	Maintain the SWMP on site.	x				Surface and Groundwater Pollution.	The water quality (constituents listed in the WUL) of the surface water resources must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Monthly
					Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms)									An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory	SHEQ Department	Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.

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														requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		
														Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
					Vehicles/ machinery will be regularly monitored and maintained. Maintenance programmes in this regard will be established and implemented.									Regular inspections of the integrity of the SWMP should be undertaken on site.	Engineering Department and SHEQ Department.	Quarterly
					All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site									GN704 Audits should be conducted on site.	Hydrologist	Annually
					Any spills occurring during the collection process must be cleaned up immediately.			Maintain a 100% no-spill record.	x			x		An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.	SHEQ Department	Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.
					Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated,									A Truck Parking Operational Plan must be developed and signed by all transportation companies in		Truck Parking Operational Plan developed prior to the operation of the site.

Name of Activity		Potential Impacts			Mitigation Type					Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					ameliorated or removed for safe disposal.									which the safety, operational and environmental requirements are stipulated.		
					Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this event a remediation strategy should be developed and enforced.									A penalty system must be developed for non-compliance.		Signing of Truck Parking Operation Plan prior to site access.
					A clean up procedure (i.e. Works Instruction) must be in place.			Clean any spills within 24 hours.	x			x		Clear signage must be erected on site detailing: • Responsible persons and contact details; truck requirements (i.e. spill kits, tarpaulins, etc.); • incident reporting procedures; and • location of spill or absorption kits.		Signage to be erected as part of construction phase.
		Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	-9	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	-5	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	x			x	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
					Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards unacceptable levels (non-compliances)].									Dust dispersion will be monitored as part of the overall mine dust monitoring programme.		
														A Truck Parking Operational Plan must be developed and signed by all transportation companies in which the safety, operational and environmental		Truck Parking Operational Plan developed prior to the operation of the site.

Name of Activity		Potential Impacts			Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														requirements are stipulated.		
														A penalty system must be developed for non-compliance.		Signing of Truck Parking Operation Plan prior to site access.
														Clear signage must be erected on site detailing: • Responsible Persons and contact details; • Truck requirements (i.e. spill kits, tarpaulins, etc.); • Incident reporting procedures; and • Location of spill or absorption kits.		Signage to be erected as part of construction phase.
					During operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet to reduce dust creation.			Recording of dust fall out to determine trends. Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	x			x	Complaints Register.	A complaints register should be in place on site.	SHEQ Department.	Ongoing
					Tarpaulins will be placed over all vehicles transporting product.									Complaints should be acknowledged with an action plan recommended.	SHEQ Department	Acknowledgement within 24 hours, with an action plan within 7 days.
		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.	-7	Machinery and vehicles will be well maintained to prevent excessive noise and to comply with national and provincial regulations.	-4	Protect the ambiance of the area, as well as maintain good relationships with surrounding land users.	Implement a noise monitoring network.	x			x	Elevated Noise Levels.	Ambient noise monitoring should be undertaken	SHEQ Department	Monthly (during the day and during the night)
					All vehicles will have muffles to minimise noise emissions, where necessary.									A Truck Parking Operational Plan must be developed and signed by all transportation companies in which the safety,		Truck Parking Operational Plan developed prior to the operation of the site.
					All transportation companies will be informed of the requirements in terms											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					of well-maintained trucks and any fines associated with non-compliance.									operational and environmental requirements are stipulated.		
					Should trucks arrive on site, not on standard in terms of maintenance these may not be allowed access to site.									A penalty system must be developed for non-compliance.		Signing of Truck Parking Operation Plan prior to site access.
		Visual	No further impacts are foreseen.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	The safe parking of trucks within the mining area will have a positive impact on the area.	-14	No trucks may be parked on either the Two Rivers Platinum Mine access road or the Sekhukhune Regional road.	14	Protection of all road users.	Aim to achieve zero accident statistics.				x	Achieve safety and road standards.	Implementation of an Operating Procedure in terms of logistical requirements of road usage between Two Rivers Platinum and Dwarsrivier.	Engineering Department.	Immediately
					Operate the Truck Parking facility in terms of the approval from the relevant Roads Agency regarding the design and operation of the road.									Implementation of code of Practices and Health and Safety Requirements.	SHEQ Department to Coordinate	Immediately
					Approved agreement between Two Rivers Platinum and Dwarsrivier Mines regarding the logistics of road usage.									Maintain discussions and feedback meetings with the impacted parties and maintain records of such consultation.	Engineering Department.	Quarterly, and more regularly if required.
														Monitor the implementation of the Operating Procedure during the exploration drilling phases.	Environmental Department.	Quarterly
Storage of Water in Reservoir	2	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Overflow of Dams could result in the increase of erosion around these facilities.	-9	Water levels should be monitored and should be maintained at a 0.8m freeboard.	-5	Operate storage facilities to ensure no overflows take place.	0% spills must be maintained.		x		x	Surface water contamination and erosion prevention.	The water quality (constituents listed in the WUL) of the reservoir must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be	SHEQ Department	Monthly
					Maintenance of all storm water anagement systems must be undertaken regularly on site.											
					Water structures should be monitored to											

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					ensure the integrity of these facilities.									undertaken by an accredited laboratory.		
		Ecology	Ongoing overflows of the Treated Water Reservoir, could lead to permanent erosion, which will impact on the ecological establishment in this area.	-9	Water levels should be monitored and should be maintained at a 0.8m freeboard. The Treated Water Reservoir should be covered to limit access to animals or avifauna. Maintenance of all storm water management systems must be undertaken regularly on site. Water structures should be monitored to ensure the integrity of these facilities.	-5	Operate storage facilities to ensure no overflows take place.	0% spills must be maintained.		x		x	Loss of soils and ecology.	Monitoring of erosion control.	SHEQ Department	Weekly inspections
		Riparian and Wetlands	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Groundwater	No impact, but a cumulative possible outcome.	-	The mine should optimise the internal water circuit to allow for the reduction of groundwater supply where possible.	13	Optimisation of internal water circuit.	Reduction in the need for top-up water from groundwater resources.				x	Water Conservation and Demand Management.	Annually assess the water balance, and associated Water Conservation and Demand Management Plan.	SHEQ Department	Annually
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	The establishment of the reservoir could in future allow for the reduction of the need for groundwater supply to the mine.	-11	The mine should optimise the internal water circuit to allow for the reduction of groundwater supply where possible.	13	Optimisation of internal water circuit.	Reduction in the need for top-up water from groundwater resources.				x	Water Conservation and Demand Management.	Annually assess the water balance, and associated Water Conservation and Demand Management Plan.	SHEQ Department	Annually
Offices, Laydown Areas and Security Upgrades	2	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil	Contamination of soil due to hydrocarbon spills	-11	Vehicles and machinery will be regularly maintained. Maintenance programmes will be established and implemented.	-2	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil pollution	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine	ECO SHEQ Department	SHEQ: Daily internal inspections. Recording of incidents when occurring.

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														whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		ECO: Annual External Audit. Annual induction of mine personnel.
					All refuelling of vehicles and equipment maintenance must be done within designated bunded areas.									Ensure that spill and absorption kits are present at all times.		
					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.									Induction with the view on creating environmental awareness.		
		Ecology	The establishment of alien and invasive plant species.	-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.	-2	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of alien and invasive species by 90% on site.	x			x	Proliferation of alien and invasive species.	An alien and invasive plant species control/ eradication and management plan must be implemented on site. This must be implemented prior to the growing season. An ecological study should be undertaken to determine the status of	SHEQ Department and a Specialised Ecologist.	Alien and invasive plant species monitoring (monthly) Alien and invasive plant species eradication (annually or as required) Ecological Study (annually)
					If natural succession of vegetation is not established within one rainy season, after rehabilitation, the disturbed areas and areas adjacent to the											

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					infrastructural areas must be revegetated with an indigenous grass mix, if necessary, to re-establish a protective cover, to minimise soil erosion and dust emission.									revegetation on the site especially around the rehabilitated areas.		
			Accidental death of animals on the roads.	-13	Clearly marked signs will be erected along the transportation routes to create awareness of animal crossings. A clearly indicated 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.	-1	Awareness creation on the importance of that natural ecosystem in which the mine operates. Implementation of safe operation practices.	Zero animal fatality.	x			x	Creation of environmental awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
		Riparian and Wetland Habitats	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Surface Water	Contamination of surface water resources. There are no surface water resources in the area where the infrastructure is proposed, however, the natural runoff, which must be managed internally on site could become impacted.	-9	Clean and dirty water separation systems should be maintained.	-2	Operate the site to limit the presence of spills and discharge thereof through runoff.	Maintain the SWMP on site.	x				Surface and Groundwater pollution.	The water quality (constituents listed in the WUL) of the surface water resources must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.	SHEQ Department	Monthly
					Manage storm water flow with temporary erosion control measures where possible (cut-off trenches or berms).									An incident reporting procedure should be available on site and definitions must be developed to	SHEQ Department	Reporting of incidents in terms of Environmental Authorisations, but generally within 24

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														determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements as and when required.
					Conveyors associated with the Plant Product Stockpile will be maintained and constructed with the appropriate culverts and drains, levelling and surfacing to ensure adequate drainage.									Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
					Vehicles and machinery will be regularly monitored and maintained. Maintenance programmes will be established and implemented.									Regular inspections of the integrity of the SWMP should be undertaken on site.	Engineering Department and SHEQ Department	Quarterly
					All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site									GN704 Audits should be conducted on site.	Hydrologist	Annually
					Any spills occurring during the collection process must be cleaned up immediately.			Maintain a 100% no-spill record.	x			x		An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable. Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL	SHEQ Department	Reporting of incidents in terms of Environmental Authorisations, but generally within 24 hours of occurrence. Update of the Incident Reporting Procedure in terms of the procedure requirements.

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														and Environmental Authorisations.		
					Soil that has been contaminated by spillages, seepages and leachates will be sampled and analysed. If necessary, the soils will be treated, ameliorated or removed for safe disposal.									A Truck Parking Operational Plan must be developed and signed by all transportation companies in which the safety, operational and environmental requirements are stipulated.		Truck Parking Operational Plan developed prior to the operation of the site.
					Any significant spills must be captured in the incident reports and must be reported to the relevant department. In this event a remediation strategy should be developed and enforced.			Clean any spills within 24 hours.	x			x		A penalty system must be developed for non-compliance.		Signing of Truck Parking Operation Plan prior to site access.
					A clean up procedure (i.e. Works Instruction) must be in place.									Clear signage must be erected on site detailing: Responsible persons and contact details; Truck requirements (i.e. spill kits, tarpaulins, etc.); Incident reporting procedures; Location of spill or absorption kits.		Signage to be erected as part of construction phase.
		Groundwater	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Air Quality	The use of unsurfaced roads may lead to an increase of dust emissions in the area.	-9	Install air quality monitoring stations that determine fallout and respirable dust (PM10) concentrations that could arise from the mining activities.	-2	Reducing dust emissions on site.	Zero complaints from surrounding landowners regarding dust.	x			x	National Dust Regulations compliance.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
					Dust suppression should be undertaken if required [(i.e. on recommendation by the ECO and/or if indicated in the monitoring reports, that the current dust fall out results are increasing towards											

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					unacceptable levels (non-compliances)].											
					Roads and walkways around office areas will be paved as far as practically possible.											
					During the operational phase of the mine, haulage roads will be treated with dust suppression techniques such as wet suppression to reduce dust creation.			Recording of dust fall out to determine trends. Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.	x			x	Complaints Register.	A complaints register should be in place on site.	SHEQ Department.	Ongoing
					Tarpaulins will be placed over all vehicles transporting product.									Complaints should be acknowledged with an action plan recommended.	SHEQ Department	Acknowledgement within 24 hours, with an action plan within 7 days.
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		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.	-7	Machinery and vehicles will be well maintained to prevent excessive nose and to comply with national and provincial regulations.	-4	Protect the ambiance of the area, as well as maintain good relationships with surrounding land users.	Implement a noise monitoring network.	x			x	Elevated Noise Levels.	Ambient noise monitoring should be undertaken.	SHEQ Department	Monthly (during the day and during the night)
					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.											
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
Diesel Storage and Underground Supply	3	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Contamination of soil resources due to hydrocarbon spills.	-11	Storage of fuels and oils, the refuelling of vehicles and equipment maintenance must be limited to designated, bunded areas (bunds to	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil pollution	The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are	SHEQ Department	SHEQ: Weekly monitoring ECO: Annual external audits can be undertaken.

Name of Activity		Potential Impacts		Mitigation Type		Time Period for Implementation								
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					be 110% of volume of the materials stored).									undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		Induction of mine personnel: Annually
					All fuels and soils must be stored in appropriate containers and bunded areas.									An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable.		
					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).									Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		
					Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.									Induction with the view on creating environmental awareness.		
					Oils and potentially hazardous materials must be disposed of at a licensed facility and waste certificates obtained.									The design of the facilities, especially where hydrocarbons are managed, should be maintained in such a manner as	Engineering Department and SHEQ Department.	

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														to ensure that spills cannot exist contained areas.		
					A spill kit must be provided to be used in the event of a spill.		Awareness creation on site regarding duty of care and waste management.						Creation of awareness.	Ensure that a Hydrocarbon Management Procedure and Spill Prevention and Emergency Spill Response Plan is available on site and updated regularly.	SHEQ Department	Regular update in terms of procedure requirements.
					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 (LDEDET, CMA/DWS).											
					Pipelines 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.									Induction with the view on creating environmental awareness.	SHEQ Department	Annually for permanent staff. Start of each visit for contractors.
					Safety signage must be used at designated storage areas as well as transportation pipelines.											
					At least weekly inspections should be undertaken around the diesel bunded 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											

Name of Activity		Potential Impacts			Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					management measures.											
		Ecology	Spills of hydrocarbons could damage the ecological character along pipeline routes.	-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.	-5	Proper waste and hydrocarbon management practices on site.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Creation of environmental awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Induction at the start of each visit for contractors. SHEQ: Weekly inspections. Hydrocarbon reconsolidation sheet to be reported on monthly. Induction annually for permanent staff.
					At least weekly inspections should be undertaken around the diesel bunded areas and supply pipelines.								Remediation.	Log of hydrocarbons stored and piped on site should be reconciled regularly to determine whether leaks are present. The SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	SHEQ Department	
		Wetlands	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Riparian Habitat	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		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.	-11	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-6	Protect the integrity of the Storm Water Management System.	Maintain the SWMP on site.				x	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr Requirements.	SHEQ Department	Assessments: Weekly. Monitoring: As per approved WUL. Waste Manifest reconsolidation weekly.
					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.									The water quality (constituents listed in the WUL) must be monitored and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
					Clear signs informing staff of waste management practices must be implemented on site.			Aim to achieve a zero-spill record.								
					The monitoring 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.									An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable.		
					Clean any spills within 24 hours.											
					Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site.			Provide training to all staff on best practices regarding waste management every year.						Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		
					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											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					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 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.	-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 around upstream of the facility must be maintained. Recycling practices must be investigated and implemented on site.	-5	Proper waste management practices on site.	Maintain a 100% compliance with the conditions of the NEM:WA Permit on site for the Salvage Yards.				x	Surface Water Pollution & Soil Assessments.	Up to date waste manifests must be kept on site. Up to date permits of landfill sites, and waste transporters should be kept on site.	SHEQ Department	
		Groundwater	Large scale hydrocarbon spills could be present at the mining area.	-10	Pipelines must 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	-5	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the proposed projects.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained		x		x	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with	SHEQ Department	Assessments: Weekly. Monitoring: As per approved WUL and Waste Management Licence Inductions upon commencement of activities and

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					may be a potential leak on a pipeline.			within the IWWMP.						the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory		annually thereafter.
					At least weekly inspections should be undertaken around the diesel bunded areas and supply pipelines.									The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
					No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.									An incident reporting procedure should be available on site and definitions must be developed to determine when		

Name of Activity			Potential Impacts		Mitigation Type					Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														an incident is reportable.		
					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).									Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		
					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.									Induction with the view on creating environmental awareness.		
					Any spills occurring during the collection process must be cleaned up immediately.			Aim to achieve a zero-spill record.						The design of the facilities, especially where hydrocarbons are managed, should be maintained in such a manner as to ensure that spills cannot exist contained areas.		
					Any significant spills must be captured in the incident reports and must be reported to the relevant department (LDEDET, CMA/DWS).											
					All equipment and machinery should be kept in good working order.									Log of hydrocarbons stored and piped on site should be reconciled regularly to determine whether leaks are present.		
					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.	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-6	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions		x		x	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly (during construction); Biannually (after construction).
					The workshop should be designed with the suitable waste containment measures											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					(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 licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.			within this IWWMP. Maintain a 100% safe disposal record on the disposal of hazardous waste.						undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored quarterly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory		
		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	Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soils	Contamination of soil resources due to hydrocarbon spills.	-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. Chemicals and hazardous material must be stored in suitable containers, fit for purpose and in line with SDS requirements.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.	x			x	Soil pollution	The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a	SHEQ Department	SHEQ: Weekly monitoring. ECO: Annual external audits can be undertaken.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Where drip trays are too small, specially prepared, non-pervious bunds with solution trenches must be used to capture spillages.									checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
					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.		Awareness creation on site regarding duty of care and waste management.							Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.
					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	-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.	-5	Protecting of soil integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x	Soil Integrity	Contracts must be in place for the provision of chemical toilets where required. Removal companies must have the necessary contracts and permits in place.	SHEQ Department	Daily internal inspections Annual review of supply and removal companies' contracts and permits.
		Ecology	The unmanaged disposal of waste could result in the	-12	Develop dedicated waste handling areas;	-5		No unlawful disposal of	x			x		Ongoing waste classification and	SHEQ Department	

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			spread of invader species, as well as the influx of opportunistic species.		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.		Proper waste management practices on site.	waste. Registration of all waste handling and/or storage areas on site.					Implementation of rehabiltation strategy.	management processes to be implemented. Up to date waste manifests must be kept on site. Up to date permits of landfill sites, and waste transporters should be kept on site.		SHEQ: Weekly inspections.
		Riparian Habitat and Wetlands	Various non-perennial drainage channels are present in this area. The Truck Parking will also be located in close proximity to a drainage channel.	-10	Remain at all times outside of the 1:100 year flood line of the watercourses and those buffers as stipulated in the EMPr. Ongoing biomonitoring should be undertaken at the upstream and downstream monitoring points. Ongoing surface water monitoring should be undertaken at the upstream and downstream monitoring points. An approved SWMPs 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.	-5	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the WUL.	Ongoing biomonitoring and water quality assessments.	Aquatic Specialist.	Surface water monitoring in line with the current monitoring programme.
		Surface Water	Handling of Hazardous Waste within diesel storage areas, laydown areas 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.	-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	-6	Protect the integrity of the Storm Water Management System.	Maintain the SWMP on site.				x	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with	SHEQ Department	Assessments: Weekly. Monitoring: As per approved WUL.

Name of Activity			Potential Impacts		Mitigation Type											
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					different waste streams.									the EMPr requirements.		
					Waste management training must be implemented on site.									The water quality (constituents listed in the WUL) must be monitored and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
					Clear signs informing staff of waste management practices must be implemented on site.			Aim to achieve a zero-spill record.						An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable.		
					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 (LDEDET, CMA/DWS).											
					Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site.			Provide training to all staff on best practices regarding waste management every year.						Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		
					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.											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
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			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.	-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. Recycling practices must be investigated and implemented on site.	-5	Proper waste management practices on site.	Maintain a 100% compliance with the conditions of the NEM:WA Permit on site for the Salvage Yards.				x	Surface Water Pollution & Soil Assessments.	Up to date waste manifests must be kept on site. Up to date permits of landfill sites, and waste transporters should be kept on site.	SHEQ Department	
		Groundwater	Large scale hydrocarbon spills could be present at the mining area	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-5	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the IWWMP.		x		x	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised system. Analysis	SHEQ Department	Assessments: Weekly. Monitoring: As per approved WUL. Regular induction (at least annually).

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
														of results must be undertaken by an accredited laboratory		
					No activities associated with hydrocarbons and/or chemicals may be undertaken outside of an effectively designed and contained area.									The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.		
					All used oils must be removed from site by a licensed company and disposed of at a suitably licensed site.									An incident reporting procedure should be available on site and definitions must be developed to determine when an incident is reportable.		
					Any spills occurring during the collection process must be cleaned up immediately.									Reportable incidents should be reported to the Regulatory Authority as per the regulatory requirements, as well as stipulations as part of the WUL and Environmental Authorisations.		

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Any significant spills must be captured in the incident reports and must be reported to the relevant department (LDEDET, CMA/DWS).									Induction with the view on creating environmental awareness.		
					All equipment and machinery should be kept in good working order.			Aim to achieve a zero-spill record.						The design of the facilities, especially where hydrocarbons are managed, should be maintained in such a manner as to ensure that spills cannot exist contained areas.		
					A clean up procedure (i.e. Works Instruction) must be in place.									Log of hydrocarbons stored and piped on site should be reconciled regularly to determine whether leaks are present.		
			Handling or Hazardous Waste within workshops and general mine area.	-10	Clean and dirty water separation systems should be incorporated in terms of the 2016 SWMP or any approved update thereafter.	-6	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the IWWMP.		x		x	Groundwater Pollution and potential trends & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMP Requirements. The groundwater quality (constituents listed in the WUL) must be monitored quarterly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Assessments: Weekly. Monitoring: Quarterly (during construction). Biannually (after construction)
					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.			Maintain a 100% safe disposal record on the disposal of hazardous waste.								
					Hazardous waste should be removed by a licenced removal											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbMs	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					company and taken to a suitable and licenced landfill site. Documentation of removal and safe disposal of hazardous waste must be available on site.											
			Handling and Storing of Domestic Waste	-12	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. Records and manifests of waste disposal should be kept on file and in good order. Groundwater monitoring must be undertaken in such a manner as to ensure that any potential impacts from the landfill site can be detected.	-9	Proper waste management practices on site.	Maintain a 100% compliance with the conditions of the NEM:WA Permit on site for the Salvage Yards.				x	Surface Water Pollution & Soil Assessments.	Up to date waste manifests must be kept on site. Up to date permits of landfill sites, and waste transporters should be kept on site.	SHEQ Department	Assessments: Weekly. Waste Manifest reconsolidation: weekly. Monitoring: As per approved WUL and Waste License
		Air Quality	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-

Name of Activity	Project	Impact Area	Potential Impacts	SbMs	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM				
		Visual	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 70: Impacts to be mitigated in their respective phases (Decommissioning Phase)

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM				
Decommissioning and Closure Phase																
Legal Requirements (Environmental Permits)	1, 2, 3	Legal Compliance	Unlawful activities could lead to NWA Directives and Section 24G Rectification fines.	-14	A legal assessment of all activities must be undertaken annually to ensure that all are licensed.	17	To operate within the enviro-legal ambits of South Africa.	Ensure that all activities undertaken by the mine are lawful with the required environmental licences in place.			x		Compliance in terms of Regulatory Requirements and the implementation of the EMPr.	Appointment of an Independent ECO to assess compliance with the EMPr. Quarterly (during construction); Biannually (after construction). internal audits must be undertaken during the construction phase, where after biannual internal audits can be undertaken, to ensure compliance with the Environmental Authorisation and EMPr. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and	Independent ECO & SHEQ	SHEQ: Daily ECO: Weekly;
					A detailed Closure Plan must be developed and submitted to the relevant departments for approval.		To be aware of the latest environmental legal requirements.	Ensure that all environmental authorisations are implemented on site and ongoing monitoring of compliance are undertaken to reach 100% compliance.								
					All legally appointed personnel responsible or involved in activities on site must receive training on the requirements of the Environmental Authorisations and EMPr's			All Departments responsible for development of the mine, must understand the requirements of the environmental legislation and must involve								
					Quarterly monitoring of decommissioning activities must be undertaken, on the lawful implementation											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					of the Environmental Authorisation.			this into their planning processes.						feedback to the management team.		
					Environmental Authorisations and all related permits must be available on site at all times.											
					The legal register must be updated to indicate all updated activities.											
Rehabilitation of Exploration Drilling Sites		Geology	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	Returning the area to be stable and free draining.	-14	All drilling pads should be rehabilitated upon completion of that specific drilling portions to conform to the end land use requirements. The landscape should be backfilled and reprofiled to mimic the natural topography for potential agricultural activities and grazing opportunities post-mining. If possible ensure a continuation of the pre-mining surface drainage pattern.	13	Free draining environment.	Achieve 100% compliance with post-mining land use commitment.				x	Ongoing rehabilitation	Appointment of an Engineer who will facilitate and manage the final shaping of the Environment.	SHEQ Department	Survey of the area: monthly
					All exploration roads should be rehabilitated once the exploration in that area has been completed and the roads are no longer required.											
					The roads and drill pads should be graded and sloped to blend into the surrounding environment.									Appoint and Ecologist to initiate the revegetation of all rehabilitated area, including the slopes.	SHEQ Department Specialist Ecologist	SHEQ: Weekly assessments of vegetation establishment Ecological Study annuall
					Where any slopes with steep gradients are present 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.											
		Soils	Decommissioning activities could lead to	-13	All drilling pads should be rehabilitated upon completion of that specific	13	Compacted soils will be ripped and topsoil will be	Develop the area to its	Continuo us rehabilita			x	x		Erosion protection measures should be implemented	

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			additional erosion in the area.		drilling portions to conform to the end of land use requirements.		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 soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation.	intended final land use.	tion of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWS.					and monitored on areas identified. Photographic records of assessments must be kept.		
					All exploration roads should be rehabilitated once the exploration in that area has been completed and the roads are no longer required.		Where sites have been alienated of vegetation or where soils have been compacted or covered with concretes, these sites will be ripped and ploughed.							Soil erosion and incorrect stockpiling of topsoil.		Independent ECO and SHEQ Department.
					Compacted soils adjacent to the activities and associated infrastructure footprint can be lightly ripped to at least 25cm below ground surface to alleviate compaction prior to re-vegetation.		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									
					Where slopes have steep gradients due to the surrounding landscape measures should be implemented to assist with the trapping of seeds and											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					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.		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									
		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 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 further 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. The following significances should be noted for the Drilling Projects: • Sekhukhune Mountain Bushveld (Impact on floral habitat and species	-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/ threatened species, presence of the CBA and ESAs and the importance thereof. Harvesting of plants and poaching of animals will be prohibited and a fine and/or disciplinary 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-planted. The seed mixture should be incorporated into mulch which includes fertiliser and germination acceleration agents where required. Regular application of fertiliser, if required, should take place in order to ensure efficient establishment of	14	To achieve final land use	The primary goal is to achieve a stable, climax state, representative of the Sekhukhune Mountain Bushveld vegetation type where the ecological function of the plant community is tolerant of local environmental conditions.				x	Ongoing rehabilitation	Appoint and Ecologist to initiate the revegetation.	SHEQ Department. Specialist Ecologist	Weed monitoring (monthly). Weed eradication (annually or as require). Regular inspections on the establishment of vegetation. Ecological Study (annually)

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation						
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			diversity): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Mountain Bushveld (Impact on floral SCC): Medium High if unmanaged, and Medium Low if mitigated); • Sekhukhune Bushveld (Impact on floral habitat and species diversity): Medium High if unmanaged, and Low if mitigated); • Sekhukhune Bushveld (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Freshwater habitat (Impact on floral habitat and species diversity): Medium High if unmanaged, and Medium Low if mitigated); • Freshwater habitat (Impact on floral SCC): Medium High if unmanaged, and Low if mitigated); • Old Agricultural Lands (Impact on floral habitat and species diversity): Low if unmanaged, and Very Low if mitigated); • Old Agricultural Lands (Impact on floral SCC): Low if unmanaged, and Very Low if mitigated); • Transformed Habitat (Impact on floral habitat and species diversity): Very Low if unmanaged, and Very Low if mitigated);		vegetation cover until such time as sufficient organic matter is being produced by the established grasses to allow for self-sustaining growth Compacted soils within and adjacent to project footprint areas can be lightly ripped to at least 25cm below ground surface to alleviate compaction prior to re-vegetation. Soils recovered during construction should be re-used to rehabilitate the project footprint areas following 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. 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. Ongoing monitoring of vegetation establishment should be undertaken by a qualified ecologist. 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										

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			Transformed Habitat (Impact on floral SCC): Very Low if unmanaged, and Very Low if mitigated).		naturally as seeds from the neighbouring Sekhukhune Mountain Bushveld areas are also introduced and given opportunity to 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 within the rehabilitation areas.											
		Riparian and Aquatic System	Loss or Impact on Riparian and Aquatic System	-13	No activities are planned within the buffers as stipulated in the EMPr. This restriction should be maintained. Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, a clean water diversion system may remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible. 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. All affected areas should be resloped and dressed with topsoil where necessary	-4	Protect sensitive ecosystems.	Remain within the designated footprints at all times.				x	Location of approved activities.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements.	ECO and SHEQ Department	SHEQ: Weekly monitoring. ECO: Monthly for the decommissioning phase. .

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM				
					and reseeded with indigenous grasses. It is critical that ongoing monitoring of alien vegetation is maintained post-closure, as proliferation of alien vegetation in the demolition areas is expected. Ongoing aquatic biomonitoring should take place throughout the closure phase of the mine and should continue into the post closure phase to define latent impacts that need to be mitigated.											
		Surface Water	Decommissioning activities may impact on the runoff and siltation of watercourses.	-12	No activities may take place within 100m between the Richmond Dam and the drilling activities. Where 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 No activities may take place in the 1:100 year flood line unless approved by the DWS. 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.	-6	Final Land Use to have no impact on the surrounding or underlying water resource.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the WUL.			x	x	Surface Water Runoff	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
		Groundwater	Contamination of groundwater resources.	-12	All boreholes must be sealed upon completion to prevent ingress of water from surface.	-5	Protection of groundwater resources	Achieve 100% compliance to the water quality objectives as	-	-	-	x		Ongoing Monitoring.	SHEQ Department and Hdrogeologist	Quarterly groundwater monitoring.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					Any completed borehole that is not required for groundwater monitoring, must be sealed and rehabilitated to prevent groundwater contamination. Rehabilitation of exploration boreholes as well as the site and access tracks must be undertaken upon completion of drilling at each position.			agreed to between the mine and the DWS based on the discussions within this report								
		Heritage	No direct impact.	-	-	-	-	-	-	-	-	-				
		Visual	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Noise	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Social	No direct impact.	-	-	-	-	-	-	-	-	-	-	-	-	-
		Landowner Relationships	Unlawful access to land or mining activities	-13	Early consultation to determine the requirements of both parties in terms of decommissioning and rehabilitation.	-4	Maintain good relationship with surrounding mines.	Remain within approved footprints.		x	x	x		Maintain ongoing discussions with landowners.	Engineering Manager.	Ongoing
					An open channel of consultation must be maintained throughout the process.			Remain within approved agreements.						Implement penalty systems for non-compliance with Operational Procedures.	SHEQ Department	Ongoing
					Where conflict arises, the DMR must be involved to facilitate consultation processes.			Comply with EMPr and MHSA requirements						Monitor the implementation of the Operating Procedure during the relocation of the powerline (powerline relocation will be undertaken under Eskom environmental procedures).	SHEQ Department	Ongoing
		Socio-Economic	Unlawful and unscheduled access.	-13	Detailed contracts must be reviewed and implemented to avoid later disputes. These contracts should include the timing of activities and the people who will access the land.	1	Maintain good relationship with surrounding mines.	Approved operating procedure for the operation of activities.		x	x	x	Continuation of economic activities in the area resulting from the activities	Maintain ongoing discussions with landowners.	Engineering Manager	Ongoing
					All activities should remain within the approved contracts.									Implement penalty systems for non-compliance with Operational Procedures.	SHEQ Department	Ongoing

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM				
					A list of contact people and responsible parties should be updated		No impact on economic activities in the area.	Good relationship with surrounding mines.						Monitor the implementation of the Operating Procedure during the relocation of the powerline (powerline relocation will be undertaken under Eskom environmental procedures) should this be required.	SHEQ Department	Ongoing
Dismantling and decommissioning of infrastructure and buildings, including product stockpiles	2, 3	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	Removal of infrastructure may impact on the topography.	-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 (IDP) of the area and the local authorities. Ensure the entire site remains fenced for the duration of rehabilitation. Retain security access control to the site for the duration of rehabilitation. All product stockpile to be removed from site. 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	14	Lawful removal of all infrastructure. Achieving final land use objectives.	Availability of safe disposal certificates. Free draining environment, with successful self-succession establishment.				x	Waste Disposal Ongoing Rehabilitation	Audits on safe disposal records and inspections at disposal sites. Inspections in terms of compliance with EMPr and rehabilitation commitments.	SHEQ Department	Weekly inspections of rehabilitation progress. Monthly inspection of waste disposal records. Biannual inspections of disposal sites.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					items is agreed upon, in writing, with the DMR. All surface infrastructure would be demolished and removed to a depth of 1m. Any infrastructure below 1m 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 storage areas and product stockpiles may result in the contamination of soils.	-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. Any hydrocarbon, effluent or other contaminants should be collected and the soils remediated immediately.	-5	Protection of Soil Integrity.	Zero presence of contaminated land due to early detection and implementation of actions.				x	Soil Integrity	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. This should be undertaken by means of a thorough site visit, record keeping of findings in a checklist format, issuing of non-conformances to responsible parties, listing thereof on the Isometrics or similar reporting system and feedback to the management team.	ECO SHEQ Department	SHEQ: Daily internal inspections. SHEQ: Recording of incidents when occurring. ECO: Annual External Audit.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			Contamination of soils as a result of a lack of sanitary services	-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.	-5		Zero presence of contaminated land due to early detection and implementation of actions.				x	Soil Integrity	Contracts must be in place for the provision of chemical toilets where required. Removal companies must have the necessary contracts and permits in place.	SHEQ Department	Daily internal inspections Annual review of supply and removal companies' contracts and permits.
			Loss of soils due to decommissioning activities present on site.	-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 within and adjacent to the project footprint areas can be lightly ripped to at least 25cm 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 are 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.	-5		Maintaining soil integrity, with successful vegetation establishment.				x	Soil erosion and incorrect stockpiling of topsoil.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements.	Independent ECO and SHEQ Department.	ECO: Annual external audits can be undertaken. SHEQ: Weekly monitoring
													Soil integrity analysis	Chemical analysis of the fertility of soils.	Soil Scientist	Prior to placement of soils.
		Ecology	The establishment of alien and invasive plant species.	-13	An alien and invasive plant species control/eradication and management programme will be developed and implemented to eradicate alien and invasive plant species and to prevent new invasions during closure and decommissioning if infrastructure. Where self-succession does not establish,	-5	Limit the impact of the mining operation on the Ecological Setting of the area.	Reduce the presence of invader species by 90% on site.				x	Proliferation of alien and invasive plant species.	An alien and invasive plant species control/ eradication and management plan must be implemented on site. This must be implemented prior to the growing season. An ecological study should be undertaken to	SHEQ Department and a Specialised Ecologist.	Alien and invasive species monitoring (monthly). Alien and invasive species eradication (annually or as required). Ecological Study (annually)

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					harvested seeds and plants must be used in concurrent rehabilitation for any areas which may be affected.									determine the status of revegetation on the site especially around the rehabilitated areas.		
			Unplanned loss of floral and faunal species of conservation importance. The significance rating has been combined in this table. The specialist study indicated the following ratings: • Sekhukhune Bushveld: Impact on floral habitat and species diversity (Medium Low if unmanaged and Low if mitigated); • Sekhukhune Bushveld Impact on floral SCC (Medium Low if unmanaged and Low if mitigated); • Transformed Habitat: Impact on floral habitat and species diversity (Low if unmanaged, Very Low if mitigated); • Transformed Habitat: Impact on floral SCC (Low if unmanaged, Very Low if mitigated).	-14	All activities should be restricted to the demarcated and approved footprints. Ongoing vegetation establishment should be undertaken throughout the decommissioning and closure phase and this should be monitored by a qualified ecologist. 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 and/or disciplinary 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.	-6	Achieving final land use commitments.	Self-succession of vegetation should establish within the first rainy season after construction has been completed. Zero removal/ relocation of floral SCC and protected trees without the necessary permits in place.				x	Ongoing rehabilitation.	An operational rehabilitation plan must be implemented and audited by the SHEQ department.	SHEQ Department	Monthly
													Vegetation Establishment.	An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department and Ecologist	Monthly inspections Annual BAP study
													Invasion of Weeds and Alien Vegetation.	An alien and invasive species control/ eradication and management plan must be implemented on site. This must be undertaken prior to the growing season.	SHEQ Department and Specialised Ecologist.	Alien and invasive species monitoring (monthly). Alien and invasive species eradication (annually or as required). Ecological Study (annually)
			Accidental death of animals on the roads.	-13	Clearly marked signs must be maintained along the transportation routes to create awareness of animal crossings. A clearly marked and enforced vehicle speed will be implemented on the	-10	Awareness creation on the importance of that natural ecosystem in which the mine operates.	Zero animal fatality.				x	Creation of environmental awareness.	Induction with the view on creating environmental awareness.	SHEQ Department	Start of each visit for contractors. Annually for permanent staff.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					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.		Implementation of safe operation practices.									
		Riparian Habitat	Impact on wetlands and riparian habitats due to decommissioning activities	-10	Loss of catchment yield may occur as a result of rainfall within the designated dirty water areas which will be captured in the pollution control facilities of the mine dirty water system. To reduce the significance of the impact, any clean water diversion system should remain in place in order to direct clean water around the rehabilitated dirty water areas, and release into the adjacent freshwater resources in a controlled manner in order to avoid the creation of preferential flow paths, and mimic natural conditions as far as possible. Upon closure all haul and access roads which are no longer required, as well as all unnecessary mining infrastructure (including temporary structures) should be removed to minimise the impacts on the aquatic resources of the area beyond the life of mine. Compacted soils should be ripped and revegetated with indigenous vegetation to prevent erosion, sheet runoff, and discourage the establishment of alien floral species post-closure. Remain at all times outside of the 1:100 year flood line of the watercourses where not authorised.	-5	Remain within or approve upon the current Aquatic Health and Water Quality baseline conditions.	Improve upon the current aquatic health and water quality baseline conditions.	x			x	Compliance in terms of the approved WUL.	Ongoing biomonitoring and water quality assessments.	Aquatic Specialist.	Surface water monitoring in line with the current monitoring programme.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					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 SWMPs should be retained in and around the facilities to ensure that dirty water runoff or water with high sediment loads do not enter watercourses.											
		Wetland	Loss or Impact on FEPA Sites	-13	No activities are planned within 500m from any FEPA sites unless authorised. This restriction should be maintained.	-4	Protect sensitive ecosystems.	Remain within the designated footprints at all times.				x	Location of approved activities.	Appointment of an Independent ECO to assess compliance with the EMPr. The SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements.	ECO and SHEQ Department	SHEQ: Weekly monitoring ECO: Monthly for the decommissioning phase.
		Hydrology	Erosion control over rehabilitated areas and the prevention of erosion gullies.	-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.	-6	Protect the water resources within the area in which the mine operates.	Maintenance of storm water management systems. Implementation of a Waste Management Strategy. Meeting the conditions in terms of Section 21c &i of the WUL.				x	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results	SHEQ Department	Assessments: Weekly. Monitoring: Monthly
			Contamination of surface water as a result of removal of infrastructure.	-11	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented	-6										

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					throughout the closure and decommissioning phase.									in a centralised system. Analysis of results must be undertaken by an accredited laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.		
			Rubble and waste from site could pollute local water resources.	-8	Waste that is not removed from site should be spread, covered and suitably rehabilitated.	-6										
		Geohydrology	No direct impact	0	-	0	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	0	-	0	-	-	-	-	-	-	-	-	-	-
		Visual	Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	-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 road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.	-5	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends.				x	Comply with the National Dust Regulations.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department	Monthly Monitoring with Annual Reporting.
					Establish and implement a dust suppression plan in consultation with the ECO 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.	-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.	-5	Remain within the regulated guidelines and limits.	Recording of dust fall out to determine trends.				x	Comply with the National Dust Regulations.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department	Monthly Monitoring with Annual Reporting.
								Meeting ambient dust fall out limits in terms of applicable NEM:AQA Regulations.				x				

Name of Activity		Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	-7	The removal of all infrastructure is to take place during daytime periods only.	-5	Remain within the regulated guidelines and limits.	Machinery with low noise levels and maintained in a good order to be used and to comply with the Health and Safety Regulations.				x	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.	SHEQ Department	Ongoing consultation with surrounding landowners. Daily noise monitoring.
					Where noise becomes a nuisance, management measures will be investigated and implemented to address these.			Health and Safety Regulations in terms of noise monitoring should be met.				x				
		Social	Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	-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.	-5	Remain within the regulated guidelines and limits.	The mine forum established should continue, through which issues can be addressed, and a representative from Khumani should become involved.				x	Ongoing stakeholder consultation	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable.	SHEQ Department	Ongoing consultation with surrounding landowners.
Earth Moving, shaping and ripping of ground		Geology	No direct impact	0	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	The shaping of the site should be undertaken in such a manner that it improves the overall topography of the site.	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 and where possible, pre-mining conditions. 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.	14	Develop the area to its intended final land use.	Implement an action plan to systematically plan for closure.				x	Final land use	An operational rehabilitation plan must be implemented and audited by the SHEQ department. All exploration roads will be rehabilitated and an appropriately qualified ecologist must sign off the rehabilitation before rehabilitation contractors leave the site.	SHEQ Department Ecologist	Monthly monitoring. Prior to rehabilitation contractos leaving the sites.
		Soils	Soil erosion	-16	Re-vegetate as soon as possible.	-5	Develop the area to its intended final land use.	Continuous rehabilitation of the decommissioning area will be conducted in			x	x	Soil erosion and incorrect stockpiling of topsoil.	Erosion protection measures should be implemented and monitored on areas identified. Photographic	Independent ECO, Soil Specialist and SHEQ Department.	ECO: Weekly for the decommissioning phase. Thereafter annual external
			Ripping and topsoil replacement will restore the soil physical	13	Compacted soils will be ripped and topsoil will be replaced. After the topsoil has been replaced the area	14										

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
			characteristics prior to re-vegetation.		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 soil analyses as recommended by a soil 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			line with the Best Practice Guidelines released by the DWS.						records of assessments must be kept.		audits can be undertaken. SHEQ: Weekly monitoring Pedologist: Weekly assessment of soil rehabilitation.
		Terrestrial Ecology (Fauna & Flora)	The rehabilitation of the site will allow reestablishment of natural vegetation.	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.	13	Protect the ecological setting within which the mine operates	Free draining environment with successful self-succession in place.			x		Proliferation of alien and invasive plant species.	An alien and invasive species control/ eradication and management plan must be implemented on site. This must be implemented prior to the growing season. An ecological study should be undertaken to determine the status	SHEQ Department and a Specialised Ecologist.	Alien and invasive species monitoring (monthly) Alien and invasive species eradication (annually or as required). Ecological Study (annually).

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					On-going alien and invasive floral species control is required through all phases of rehabilitation.									of revegetation on the site especially around the rehabilitated areas.		
					The soil fertility status should be determined by soil chemical analysis after levelling (before seeding/re-vegetation). Soil amelioration should be done according soil analyses as recommended by a soil specialist, to correct the pH and nutrition status before revegetation.											
					Access to rehabilitated areas should be restricted to vehicles/ machinery specifically required for the implementation of the closure plan.											
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Hydrology	Runoff from rehabilitated areas will impact on watercourses especially during intensive rainstorms especially if the area are not free draining.	-5	The areas will be landscaped to be free draining in line with the approved storm water management plan.	13	Protect the water resources within the area in which the mine operates.	Continuous rehabilitation of the decommissioning area will be conducted in line with the Best Practice Guidelines released by the DWS.	x				Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory. Monitoring of the effectiveness of the rehabilitation programme must be undertaken. This should be undertaken by means of weekly inspections and keeping a photographic record.	SHEQ Department	Assessments: Weekly. Monitoring: Monthly.
					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.											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
		Geohydrology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Heritage	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Visual	The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	11	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been graded and re-vegetated.	13	Successful establishment of vegetation.	Remain within the designated area demarcated for activities. Remain within the NEM:AQA Dust Regulation guidelines for rural communities.				x	Comply with the National Dust Regulations.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
					Demarcate the decommissioning area and limit the decommissioning activities as far as possible.											
					Final shaping will be implemented such that the final profile of the rehabilitated areas are formed to emulate natural contours of the area.											
					Foundations will be removed to a depth of 1m below the surface and the area rehabilitated.								Vegetation Establishment.	An ecological study should be undertaken to determine the status of revegetation on the site especially around the rehabilitated areas.	SHEQ Department	Monthly
					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 will be removed if it proves											

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					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.	-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.	-5	No concerns raised by surrounding landowners regarding air quality.	Remain within the designated area demarcated for activities. Remain within the NEM:AQA Dust Regulation guidelines for rural communities.	x			x	Dust dispersion.	Dust dispersion will be monitored as part of the overall mine dust monitoring programme.	SHEQ Department.	Monthly Monitoring with Annual Reporting.
		Noise	All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	-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 I Safety Regulations. Speed control measures will be implemented by the mine through the maintenance 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. Any gravel roads that are to remain, are to be maintained in as good and	-5	No concerns raised by surrounding landowners regarding noise.	Remain within the designated area and required standards. Remain within the NEM:AQA Dust Regulation guidelines for rural communities.	x			x	Noise Monitoring.	Adjacent landowners will be informed of the planned dates of the significant demolition activities where applicable. Daily noise monitoring will be undertaken in the areas where high levels of noise take place during decommissioning.	SHEQ Department.	Daily noise monitoring. Ongoing consultation with surrounding landowners.

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					smooth a condition as possible.											
		Social	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
Cessation of Labour Contracts	**1, 2, 3**	Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Soil, Land Use and Land Capability	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		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.	-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 DMR.	14	Optimally utilise buildings and infrastructure.	Safe disposal and lawful operation of infrastructure.	x			x	Socio-Economic Character	Engage in consultation with municipalities and local industries to determine the need and recycling of existing infrastructure.	SHEQ Department.	Ongoing consultation prior to demolition.
			Loss of Employment.	-15	The mine should continue with the skills development programme and Social and Labour Plan (SLP) commitments to empower the workforce to undertake other economically viable activities.	11	Ensuring successful skills development to allow for continued economically active people and opportunities in the area post mining.	Successful implementation of skills development and opportunities on site.		x	x	x	Socio-economic character	Compliance with the Social and Labour Plan.	Human Resources (HR) Department	Biannually up until closure has been achieved.
Waste Management and decommissioning of hazardous (also fuels) substances		Geology	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Topography	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
			Spills around the diesel storage areas and product	-11	Any hydrocarbon, effluent or other contaminants	-5	Protection of soil integrity to	Zero presence of		x	x	x	Protection of soil resources.		SHEQ Department	Ongoing

Name of Activity	Project	Impact Area	Potential Impacts	SbM	Mitigation Type	SaM	Performance Objectives	Goals	Time Period for Implementation				Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
Activities			Potential Impacts		Mitigation Measures				Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM				
		Soil, Land Use and Land Capability	stockpiles may result in the contamination of soils.		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.		achieve final land use objectives.	contaminated land due to early detection and implementation of actions.						Compliance with contaminated land objectives and limits.		
		Terrestrial Ecology (Fauna & Flora)	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Wetland	No direct impact	-	-	-	-	-	-	-	-	-	-	-	-	-
		Groundwater	Handling or Hazardous Waste within workshops and general mine area.	-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 maintained on site. Hazardous waste handling should only take place within bunded and/or lined areas. Hazardous waste should be removed by a licensed removal company and taken to a suitable and licensed landfill site. Documentation of removal and safe disposal must be available on site.	-6	Protect the groundwater resources to ensure that limited to no impact on groundwater resources occur as a result of the mining operations.	Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS. Maintain a 100% safe disposal record on the disposal of hazardous waste.		x		x x	Groundwater Pollution and potential trends.	The groundwater quality (constituents listed in the WUL) must be monitored quarterly and records must be kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory	SHEQ Department	Quarterly (during construction). Biannually (after construction)
			Handling of Building Rubble	-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 1m below surface. All building rubble will follow the waste hierarchy and will therefore either be sold for reuse where possible or as a last option be disposed of at a licensed	-6		Implement and operate a detailed waste manifest on site and maintain a 100% safe			x	x				

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
					facility suitable for such waste.			disposal record on the disposal of waste on site.								
			Handling and Storing of Domestic Waste	-12	Clean and dirty water separation systems should be maintained.	-9		Achieve 100% compliance to the water quality objectives as agreed to between the mine and the DWS based on the discussions contained within the IWWMP.		x		x				
					Waste management training must be implemented on site.											
					Clear signs informing staff of waste management practices must be maintained on site.			Maintain a 100% compliance with the conditions of the Waste Licenses.				x				
					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.			Maintain a 100% accurate recording of waste and submission of such recording to the Department.				x				
								Maintain daily covering of the landfill site.	x			x				
		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.	-11	Clean and dirty water separation systems should be maintained up until closure.	-6	Develop the area to its intended final land use.	Maintain the SWMP on site.				x	Surface Water Pollution & Soil Assessments.	To ensure a proactive approach, the SHEQ Department should undertake ongoing site monitoring to determine whether activities on site are undertaken in accordance with the EMPr requirements. The water quality (constituents listed in the WUL) must be monitored monthly and records must be	SHEQ Department	Assessments: Weekly. Monitoring: Monthly.
					Waste management training must be implemented on site.			Maintain a 100% no-spill record.				x				
					Clear signs informing staff of waste management practices must be maintained on site.			Clean spills, if occur witan 24 hours.				x				
					Hazardous waste handling should only take place within bunded and/or lined areas.			Maintain a 100% safe disposal record on the disposal				x				

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
								of hazardous waste.					kept of these results in a centralised system. Analysis of results must be undertaken by an accredited laboratory.		
					Hazardous waste and contaminated materials should be removed by a licensed removal company and taken to a suitable and licensed landfill site.			Provide training to all staff on best practices regarding waste management every year.	x			x				
					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.											
			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 management system.	-9	Clean and dirty water separation systems should be maintained up until closure.	-5		Maintain a 100% compliance with the conditions of Waste License.	x			x				
					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 maintained on site.											
					Recycling practices must be investigated and implemented on site.											
					Building rubble must be disposed of in line with the requirements of the NEM:WA.			Maintain daily covering of the landfill site up until final covering.	x			x				
					Access control must be strictly enforced.			Self-succession of vegetation should establish within the first rainy	x			x				

Name of Activity			Potential Impacts		Mitigation Type				Time Period for Implementation							
Activities	Project	Impact Area	Potential Impacts	SbM	Mitigation Measures	SaM	Performance Objectives	Goals	Short Term (1-12 months)	Medium Term (1-5 years)	Long Term (5 Years +)	Throughout LoM	Compliance with Standard	Functional Requirements for Monitoring	Responsibilities	Monitoring and Reporting Frequency
								season after construction has been completed.							
		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.e Impact Management Outcomes

Please refer to Table 67 to Table 70 for the impact management outcomes.

1.f Impact Management Actions

Please refer to Table 67 to Table 70 for the action plan recommended.

1.g Financial Provision

1.g.i Determination of Financial Provision

1.g.i.1 Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22(2)(d) as described in 2.4 herein

The proposed final land use would be to return the area to wilderness area as committed to in the various EMPr's preceding this application. This would include demolishing surface infrastructure that will not be handed over to a third party and promoting the growth of the surrounding Sekhukhune Mountain Bushveld species. It is evident that the re-establishment of this vegetation biome on site will not be difficult as areas that have already undergone rehabilitation have seen a large success in terms of the revegetation.

Please refer to Section 1.d.i for the detailed discussion of the closure objectives. The management measures as presented in the EMPr has been developed to give effect to the end land use and closure objectives.

1.g.i.2 Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties

Please refer to Part A, for the detailed discussion regarding I&AP Consultation. The detailed issues and response report is attached to Annexure 4. In specific the draft EIA report and EMPr will be made available electronically to all stakeholders and in hard copy to all commenting authorities.

1.g.i.3 Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

As presented in Part A of this document, the following table presents the key closure requirements:

The following table specifically highlights closure actions important to the proposed activities:

Table 71: Summary of Rehabilitation and Closure Actions

Target Area	Main Actions
Infrastructure and Plant Area	Infrastructure such as the offices, administration buildings and workshops should be removed, unless legally transferred or sold to another party; If complete infrastructure removal is chosen, all infrastructure should be demolished to 1m below surface and the demolition rubble removed and taken to the nearest waste facility, or as per the approved EMPr (December 2010), all rubble that is created by the demolition of the plant area must be disposed of in the open mining pit. The transport of the rubble and discard materials should be done in a cost effective way; If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility; Rip disturbed areas to alleviate compaction; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Target Area	Main Actions
Product Stockpiles	All stockpiled product must be removed; If contamination in the soil is discovered around stockpiled areas, this soil should be removed and disposed of in the appropriate waste disposal facility; Rehabilitated areas must be shaped to be free draining and roughly emulate the surrounding surface topography; Rip dump and stockpile footprint areas to alleviate compaction; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Roads and Parking Areas	Mine roads that are not needed for closure and post-closure uses at the site (e.g. security and monitoring) will be closed; Removal of all signage, fencing, shade structures, traffic barriers, etc.; All 'hard top' surfaces to be ripped and bitumen/concrete removed along with any culverts and concrete structures; All concrete lined drainage channels and sumps will be demolished and removed; All potentially contaminated soils are to be identified and should be removed and remediated; All haul roads that have been treated with saline dust suppression water need to be treated as “sealed” roads with the upper surface ripped and removed to designated contaminant disposal areas; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Linear infrastructure (conveyors associated with Product Stockpile)	All power and water services to be disconnected and certified as safe prior to commencement of any demolition works; Conveyor belts to be removed, cut up and disposed offsite; Salvageable equipment will be removed and transported offsite prior to the commencement of demolition; Concrete slabs and footings will be broken and buried on site. The concrete (and metal) will be broken up and disposed of in the box cut; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Silt Traps, Water Pipelines (silt traps if required at the truck parking area and water pipelines to and from the reservoir)	Desilt the silt traps and the surrounding area that has been affected by removing silt to a depth of 500 mm; Remaining structures should be demolished to 1 m below surface and the demolition rubble removed and any re-usable items should be removed from the site; Soil should be tested for contamination; If contamination is discovered, this soil should be removed and disposed of in the appropriate waste disposal facility; The footprints of dams must be ripped to 200 mm; Appropriate topsoil sourced from the topsoil stockpiles should be replaced to a minimum thickness of 300 mm on the rehabilitated areas; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Diesel Storage Tanks	Remove diesel tanks (by owner) and associated infrastructure from site (it is assumed that all potential contamination is removed during operations); Thereafter, demolish concrete bund wall and dispose of contaminated material at a hazardous waste facility; Once the site has been cleared of all infrastructure and rubble and no contamination is present, the exposed area should be reshaped to create a gently sloping, free-draining topography; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.

Target Area	Main Actions
Weighbridge (located at the entrance to the proposed truck parking area)	Remove supporting foundations and other associated infrastructure; The footprint area should be ripped to alleviate compaction and to assist with vegetation establishment; Monitor and maintain vegetation establishment; Remove alien invasive vegetation; and Prevent access of people/machinery/vehicles/grazing animals on newly rehabilitated land to allow regeneration of vegetation and reduce erosion.
Topsoil Stockpiles	Use topsoil material as part of rehabilitation activities; The stockpile footprint area should be ripped to alleviate compaction and to assist with vegetation establishment; Monitor and maintain vegetation establishment; and Remove alien invasive vegetation.

1.g.i.4 Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation requirements stipulated in this EMPr is based on current approved closure conditions as approved in the mine's overall approved EMPr, as well as the input of various specialist studies as discussed in this report.

The rehabilitation measures requires:

- Removal of infrastructure;
- Sloping of areas to be free draining where possible;
- Replacement of topsoil;
- Allowance for self-succession, but where this is not possible, the implementation of a revegetation programme.

1.g.i.5 Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

The amount that is required to both manage and rehabilitate the environment in respect of rehabilitation is R27 873 237.30 (excluding VAT). Please refer to Annexure 7 for the detailed assessment. Also refer to Section 1.s of Part A for a discussion on the financial provision.

1.g.i.6 Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined. All areas disturbed will be included in the financial provision as calculated during the annual evalauation and will be updated and provided for annually as per the required Regulations.

1.h Mechanisms for monitoring compliance with and performance assessment against the EMPr and reporting thereon

The following sections present the monitoring requirements of the mine.

1.h.i Proposed Groundwater Monitoring Programme

Based on the current project description, the following should be monitored in terms of groundwater as part of the current monitoring programme:

Table 72: Additional monitoring programme

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
During the construction phase					
Groundwater monitoring	Monitoring of groundwater, in terms of location, frequency of sampling and reporting, and repot content, must take place in accordance with the recommendations made in the groundwater report.				
During the operational phase					
Groundwater monitoring	Monitoring of groundwater, in terms of location, frequency of sampling and reporting, and repot content, must take place in accordance with the recommendations made in the groundwater report.				
During the decommissioning phase					
Groundwater monitoring	Monitoring of groundwater, in terms of location, frequency of sampling and reporting, and repot content, must take place in accordance with the recommendations made in the groundwater report.				

1.h.ii Surface Water Monitoring

Dwarsrivier Mine established a surface water monitoring network in 2000 and consisted out of four (4) monitoring locations, spatially distributed along the Groot Dwarsrivier and Klein Dwarsrivier aquatic systems. In 2009/2010 the monitoring network was augmented to include the monitoring of water associated with selective mine infrastructure, i.e. RWDs, TSF and Clarifier.

The table below summarises the surface water monitoring network, while Figure 83 presents their spatial distribution with in relation to project infrastructure.

Table 73: Current Monitoring Network Summary

Sample Point ID	Coordinates		Description	Monitoring Period	
	Longitude	Latitude		From	To
S1	30°07'21.88"E	24°56'43.56"S	Groot Dwarsrivier: Upstream of Project site.	2000	ongoing
S2	30°06'02.57"E	24°55'44.71"S	Klein Dwarsrivier: Upstream of Project site.	2000	ongoing
S3	30°06'20.44"E	24°55'24.72"S	Groot Dwarsrivier: Downstream of Project site, after confluence with Springkaanspruit.	2000	ongoing
S4	30°06'19.90"E	24°54'30.13"S	Groot Dwarsrivier: Downstream of Project site.	2000	ongoing
S6	30°06'41.28"E	24°55'39.94"S	Return Water Dam – Lower	2009	ongoing
S7	30°06'58.28"E	24°55'54.71"S	Return Water Dam – Upper	2009	ongoing
S9	30°06'43.39"E	24°55'41.92"S	Tailings Storage Facility	2009	ongoing
C1	24°56'15.32"S	30° 7'12.28"E	Clarifier	2010	ongoing

The surface water sample points are summarised in the table overleaf.

Table 74: Surface Water Points as per current Integrated Water and Waste Management Plan (IWWMP) recommendations

Sample Point ID	Description	Coordinates	
S11	Water Collection Sump	24°55'9.28"S	30° 7'26.41"E
S12	Plant	24°55'46.39"S	30°7'3.47"E
S14	Dewatering Storage Dam	24°56'19.74"S	30° 7'14.67"E
S16	New RWD	24°55'29.00"S	30° 7'11.63"E
S17	North Shaft Settling Dams	24°55'38.32"S	30° 7'17.00"E

The following table presents the monitoring compliance including the responsible persons, implementation period, and mechanist for monitoring compliance.

The current water monitoring programme requires water quality analysis. The surface and groundwater-monitoring programme is assessed on an annual basis. Based on these assessments, new monitoring sites may be included in the monitoring programme. Chemical analyses to be conducted include, *inter alia*: TDS, pH, EC, Alkalinity, SO4, Ca, Mg, K, Cl, Na, Fe, and Mn. An annual report will be generated detailing water quality trends experienced during the operational phase, and highlighting areas of concern. This annual report will be submitted to DWS.

Water quality monitoring results will be stored on a database for use determining water quality trends. The results will be used to update and confirm the groundwater model at the end of the operational phase. Trend analysis will also assist to determine if additional management measures are required.

In addition to the above the following should be monitored based on the infrastructure expansions and drilling programmes:

Table 75: Additional monitoring programme

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
Pre-construction					
Water quality baseline	Immediately above and below the proposed development areas, within the Klein and Groot Dwarsriviers.	Water must be tested before construction commences. GPS point must be taken so that monitoring takes place consistently at the same point.	N/A - will form part of subsequent comparison reports	Results of the following must be discussed in detail: 1. pH; 2. Electrical conductivity; 3. Total suspended solids; 4. Turbidity; and 5. Any other water quality parameters as prescribed by the surface water specialist.	1.GPS 2. Camera 3. Field Form 4. Handheld multi probe 5. DO Probe (not essential) 6.Water sample
During the construction phase					
Water quality	Immediately above and below the proposed development areas, within the Klein and Groot Dwarsriviers.	Monitoring must take place at the GPS point localities that was taken for the pre-construction monitoring.	Water monitoring must be assessed on a two weekly basis in the Klein and Groot Dwarsriviers.	Report must be compiled on a monthly basis for all data collected and include mitigation and management actions that are recommended and that are undertaken.	Compare results to pre-construction assessments and aspects as listed in pre-construction report content.
During the operational phase					
Water quality	Immediately above and below the proposed development areas, within the Klein and Groot Dwarsriviers.	Monitoring must take place at the GPS point localities that was taken for the pre-construction monitoring, for three months after the completion of the construction phase.	Water monitoring must be assessed bi-weekly for three months following the completion of construction. Water monitoring must be assessed on a minimum of a monthly basis in the Klein Dwars and Groot Dwarsriviers during the operational phase of the mine.	Report must be compiled on a basis for all data collected and include mitigation and management recommendations as well as an assessment of pre-post construction changes in the water quality.	Compare results to pre-construction assessments and aspects as listed in pre-construction report content.

Table 76: Proposed Ground Water Monitoring Programme

Point	East (WGS84, LO31)	South (WGS84, LO31)	Description	Elements	Frequency
DRM1	-89 803	-2 758 421	Down gradient of Lower RWD	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total alkalinity.	Quarterly
DRM2	-89 789	-2 758 349	Down gradient of Lower RWD		
DRM3	-89 676	-2 757 996	West of quarry		
DRM4	-89 203	-2 758 623	In plant area		
DRM5	-89 422	-2 758 739	Down gradient of Upper RWD	Total Petroleum hydrocarbon (TPH)	Annually
DRM6	-88 639	-2 760 019	South of explosives bay		
DRO4/DRO	-89 936	-2 758 363	In floodplain, close to S3		
ASDWBH1	-88 527	-2 758 376	Inside north pit area	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity.	Quarterly (TPH annually)
ASDWBH10	-89 274	-2 758 136	North of old TSF		
ASDWBH11	-88 525	-2 759 132	Inside office complex		
ASDWBH2	-88 545	-2 757 234	Northern part of North Pit area		
ASDWBH3	-88 950	-2 758 090	South West of the North Pit		
ASDWBH4	-88 487	-2 757 923	East of the North Pit		
ASDWBH5	-89 194	-2 759 159	Down gradient of Dam26		
ASDWBH6	-89 080	-2 759 200	Up-gradient of Dam26		
ASDWBH9	-89 567	-2 758 424	Up-gradient of Lower RWD		
TMM	-89 156	-2 759 118	Hazardous storage area		
Sewage BH/SWBH	-88 881	-2 759 030	Down gradient of main sewage works		
North Pit	-88 848	-2 758 112	Borehole drilled into the deepest section of North Pit. Coordinates must be confirmed once on-site conditions have been evaluated.	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity. Leach tests on material drilled from borehole	Quarterly (TPH annually)
South Pit	-88 801	-2 759 047	Borehole drilled into the deepest section of South Pit. Coordinates must be confirmed once on-site conditions have been evaluated.	Ca, K, Mg, Na, SO_4, Nitrate-NO_3, Total Inorganic Nitrogen –N, Cl, F, pH, EC, TDS, Cr, Cu, Cd, Fe, V, Total Petroleum hydrocarbon (TPH), Total alkalinity. Leach tests on material drilled from boreholes	Quarterly (TPH annually)
Rainfall	TBC	TBC	Rainfall station at offices or new TSF	Not applicable	Daily

Figure 83: Surface Water Monitoring Points

1.h.iii Storm Water and Clean and Dirty Water Infrastructure

The monitoring of surface water management infrastructure must be undertaken as follows:

- Silt traps must be inspected monthly during the wet season (September – April). A record must be kept with regards to the remaining capacity and when the next cleaning action is required;
- Record each time the a silt trap is emptied/ dredged of sediment;
- The integrity of all dirty water containment structures need to be inspected on an annual basis;
- A maintenance program will be followed as part of the storm water and clean and dirty water infrastructure monitoring; and
- An updated plan of the layout of the storm water channels and silt traps must be kept.

1.h.iv Aquatic Biomonitoring

Section 1.9.1 of Appendix VI of the approved WUL states that:

"An aquatic scientist approved by the Regional Director must establish a monitoring programme for the following indices: Invertebrate Habitat Assessment System (IHAS) and the latest South African Scoring System (SASS5). Sampling must be done once during the high flow season and once during low flow period annually to reflect the status of the river upstream and downstream of the mining activities. This report aims to address the above mentioned conditions of the Dwars River Chrome Mine WUL. "

Further objectives of the current biomonitoring programme are to:

- comply with Dwarsrivier Mines' Environmental policy and Dwarsrivier Mine EMPr water monitoring requirements;
- assess the impacts on the aquatic ecosystem in areas which are affected by the activities associated to the Dwarsrivier Mine;
- monitor spatial and temporal trends in aquatic resource integrity in the vicinity of the mine;
- report any emerging issues and
- Preserve the aquatic ecosystem.

Two sites are assessed as specified in the WUL, one site up- and one downstream of the current mining operations in the Groot Dwarsrivier. In addition, two sites are selected in the process water system of the Dwarsrivier Mine for toxicological testing. Please refer to Figure 84 for an indication of the positions of the monitoring points.

The table below contains geographic information with regards to the monitoring points. The monitoring programme focused on the Groot Dwarsrivier, as it is this system which would be affected by impacting activities from the Dwarsrivier Mine and not the Klein Dwarsrivier.

Aquatic biomonitoring is undertaken to determine the impact of Dwarsrivier Mine's activities on the integrity and diversity of the aquatic ecology within the affected surface water resources.

Table 77: Monitoring points for Biomonitoring at Dwarsrivier Mine

Id	Description	Coordinates	Period	Parameter
S1	Upstream of mine	24° 56' 41.7" S 30° 07' 20.0" E	Bi-annual (wet and dry season)	IHAS*
S2	Downstream of mine	24° 55' 45.3" S 30° 06' 03.4" E	Bi-annual (wet and dry season)	SASS**
Dam 26	Situated within the Dwarsrivier complex	S24°56'5.61"S E30° 7'3.35"E	Bi-annual (wet and dry season)	Toxicity
Lower RWD	Situated within the Dwarsrivier complex	S24°55'44.80" E30° 6'42.60"	Bi-annual (wet and dry season)	Toxicity

*Instream Habitat Assessment System
**South African Scoring System

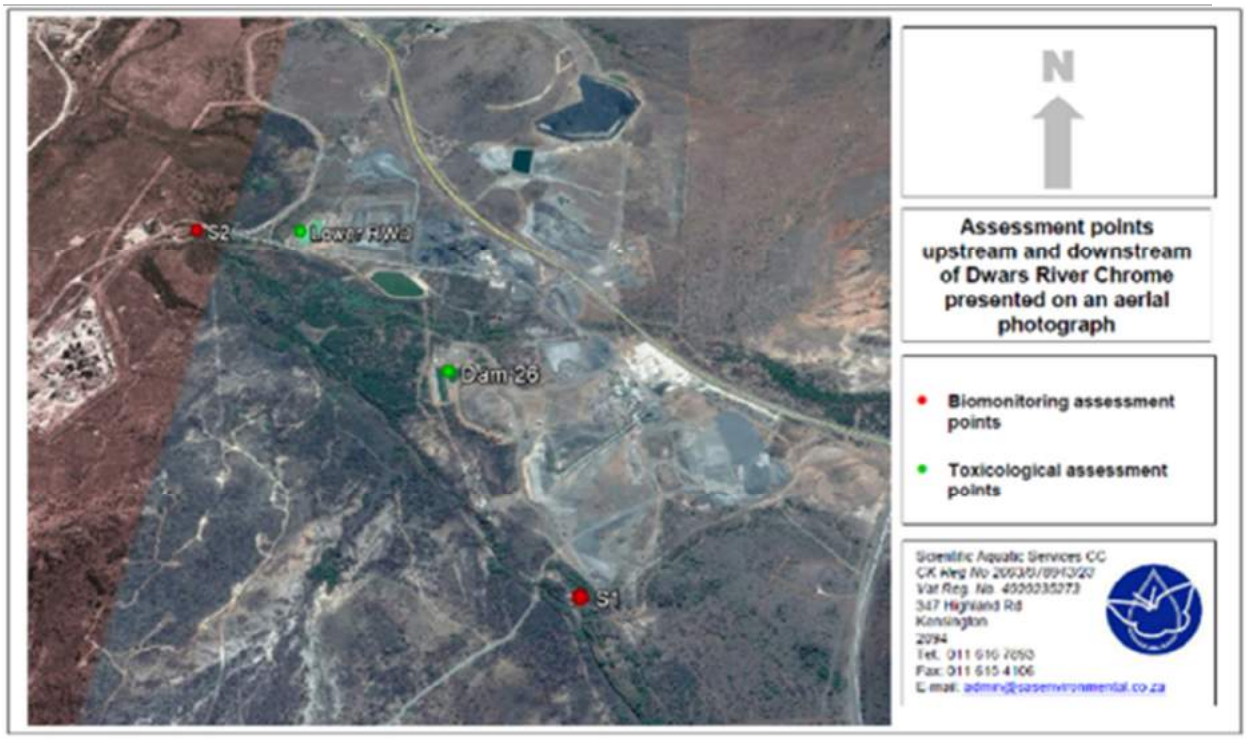

Figure 84: Biomonitoring Points

In addition to the above the following should be monitored based on the infrastructure expansions and drilling programmes:

Table 78: Additional monitoring programme

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
Pre-construction					
Aquatic bio-monitoring	Immediately above and below the proposed development areas, within the Klein and Groot Dwarsriviers.	Ongoing aquatic bio-monitoring must be undertaken to establish baseline conditions prior to the commencement of construction. GPS coordinates must be noted so that monitoring takes place consistently at the same point.	N/A - will form part of subsequent comparison reports	Results of the following must be discussed in detail: 1. In-situ water quality (pH, EC; TDS and DO) 2. Aquatic macro-invertebrate community integrity (SASS5 and MIRAI); 3. General habitat integrity (IHI and IHAS); and 4. Toxicological testing on three trophic levels (*Vibrio fischeri* (representing bacteria), *Daphnia pulex* (representing aquatic macro-invertebrates) and *Poecilia reticulata* (representing fish). Implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol if it becomes evident that discharge will take place.) 5.	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe 5. DO Probe and 6. SASS5 sampling net and trays.
Freshwater resource (riparian) ecological monitoring	All drainage systems within 100m of the activities, two points on each system (one upgradient and one downgradient of impacted areas).	Baseline conditions to be established prior to commencement of construction. GPS coordinates must be noted so that monitoring takes place consistently at the same point.	N/A - will form part of subsequent comparison reports	Freshwater resources need to be monitored using the assessment protocols as defined below unless updated methods are developed in future: 1. Wetland Ecoservices (Kotze *et al*, 2009); 2. PES according to either the Wetland Index of Habitat Integrity (DWAF 2007) or the	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
				WET-Health method (Macfarlane *et. al,* 2009); 3. Riparian zonation monitoring to determine whether impacts on base flow levels are occurring; 4. Water quality monitoring as part of the mine's water quality monitoring program; and 5. Monitoring of the riparian vegetation assemblage using the VEGRAI Ecostatus tool.	
During the construction phase					
Aquatic bio-monitoring	The biomonitoring sites described in the aquatic ecological baseline report should be used for temporal and spatial comparison.	Monitoring must take place on a quarterly basis during the construction phase.	Quarterly monitoring report compiled after every assessment.	Results of the following must be discussed in detail: 1. In-situ water quality (pH, EC; TDS and DO) 2. Aquatic macro-invertebrate community integrity (SASS5 and MIRAI); 3. General habitat integrity (IHI and IHAS); and 4. Toxicological testing on three trophic levels (*Vibrio fischeri, Daphnia pulex* and *Poecilia reticulata.* Implement the calculation of discharge dilution factors by means of the DEEEP protocol if required; and 5. Report must include mitigation and management actions that are recommended and that are undertaken.	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe 5. DO Probe and 6. SASS5 sampling net and trays.
Freshwater resource (riparian) ecological monitoring	All drainage systems within 100m of the activities, two points on each system (one upgradient and one downgradient of impacted areas).	Monitoring should take place bi-annually during the construction phase.	Bi-annual status quo reporting.	Results of the following must be compared to the baseline results and any changes in PES or EIS must be documented.	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe
Erosion	All freshwater resources falling within the focus area, and especially on the Klein Dwars, Groot Dwars and Dwars Rivers.	Monitoring of erosion should occur on a weekly basis during construction by the contractor, and after every major rainstorm. Any erosion should be captured and recorded and reported during the ECO site visit	1. After every major rainstorm and/or flood. 2. Monthly monitoring report compiled by the appointed ECO during the construction phase.	1. Brief indication of the method of assessment; 2. Assumptions and Limitations must be listed; 3. Photos and GPS point locations taken of existing erosion in the freshwater features and adjacent banks must be incorporated into the report. 4. Any erosion observed must be discussed in detail and management recommendations made; and 5. Map indicating where erosion is present. 6. Recommended and undertaken control measures.	1.GPS 2. Camera 3. Field Form 4. Measuring Tape
During the operational phase					
Aquatic bio-monitoring	The biomonitoring sites described in the aquatic ecological baseline report should be used for temporal and spatial comparison.	Monitoring must take place on a biannual basis (once during high flow and once during low flow) during the operational phase.	Six monthly monitoring report compiled after every assessment.	Results of the following must be discussed in detail: 1. In-situ water quality (pH, EC; TDS and DO) 2. Aquatic macro-invertebrate community integrity (SASS5 and MIRAI); 3. General habitat integrity (IHI and IHAS); and	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe 5. DO Probe and 6. SASS5 sampling net and trays.

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
				4. Toxicological testing on three trophic levels (*Vibrio fischeri, Daphnia pulex* and *Poecilia reticulata.* Implement the calculation of discharge dilution factors by means of the DEEEP protocol if required. 5. Report must include mitigation and management actions that are recommended and that are undertaken.	
Freshwater resource (riparian) ecological monitoring	All drainage systems within 100m of the activities, two points on each system (one upgradient and one downgradient of impacted areas).	Monitoring should take place annually during the operational phase.	Bi-annual status quo reporting.	Results of the following must be compared to the baseline results and results obtained during the construction phase, and any changes in PES or EIS must be documented. Results must be used to proactively manage modifiers such as alien vegetation establishment and erosion.	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe
Erosion	All freshwater resources falling within the focus area, and especially on the Klein Dwars, Groot Dwars and Dwars Rivers.	Monitoring of erosion should occur after every rainstorm and / flood greater than 5 mm and on a monthly basis during the wet season (September to March).	1. After every major rainstorm and / flood for the first wet season post construction. 2. Monthly monitoring report compiled by the appointed ECO.	1. Brief indication of the method of assessment; 2. Assumptions and Limitations must be listed; 3. Photos and GPS point locations taken of existing erosion in the freshwater features and adjacent banks must be incorporated into the report. 4. Any erosion observed must be discussed in detail and management recommendations made (such as revegetation etc.); and 5. Map indicating where erosion is present. 6. Control measures undertaken to be reported.	1.GPS 2. Camera 3. Field Form 4. Measuring Tape
Alien vegetation control	All freshwater resources falling within the focus area, and especially on the Klein Dwars, Groot Dwars and Dwars Rivers.	Regrowth of alien vegetation should be monitored monthly during the first growing season.	At the end of the first growing season following the completion of construction, and on an on-going monthly basis during operations.	1. Provide a list of species occurring within the study area; 2. Discuss the density of species; 3. Freshwater feature integrity and risk to be discussed; 4. Fixed point photo (Taking photo at specific point within priority area to show effect of alien vegetation control); 5. Control measures undertaken to be recorded, and; 6. Assess the necessity of further alien and invasive vegetation control.	1. GPS; 2. Field Form; and 3. Camera
During the decommissioning phase					
Aquatic bio-monitoring	The biomonitoring sites described in the aquatic ecological baseline report should be used for temporal and spatial comparison.	Monitoring must take place on a biannual basis (once during high flow and once during low flow) following decommissioning for two years.	Six monthly monitoring report compiled after every assessment.	Results of the following must be discussed in detail: 1. In-situ water quality (pH, EC; TDS and DO) 2. Aquatic macro-invertebrate community integrity (SASS5 and MIRAI); 3. General habitat integrity (IHI and IHAS); and 4. Toxicological testing on three trophic levels (*Vibrio fischeri, Daphnia pulex* and *Poecilia reticulata.* Implement the calculation	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe 5. DO Probe and 6. SASS5 sampling net and trays.

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting	Report Content	Equipment
				of discharge dilution factors by means of the DEEEP protocol if required; and 5. Report must include mitigation and management actions that are recommended and that are undertaken.	
Freshwater resource (riparian) ecological monitoring	All drainage systems within 100m of the activities, two points on each system (one upgradient and one downgradient of impacted areas).	Monitoring should take place annually during the decommissioning phase.	Bi-annual status quo reporting.	Results of the following must be compared to the baseline results and results obtained during the construction and operational phases, and any changes in PES or EIS must be documented. Results must be used to proactively manage modifiers such as alien vegetation establishment and erosion.	1. GPS 2. Camera 3. Field Form 4. Handheld multi probe
Alien vegetation control	All freshwater resources falling within the focus area, and especially on the Klein Dwars, Groot Dwars and Dwars Rivers.	Regrowth of alien vegetation should be monitored monthly during the first growing season.	Every six months for a period of two years following closure.	1. Provide a list of species occurring within the study area; 2. Discuss the density of species 3. Freshwater feature integrity and risk to be discussed; 4. Fixed point photo (Taking photo at specific point within priority area to show effect of alien vegetation control); 5. Control measures undertaken to be recorded, and; 6. Assess the necessity of further alien and invasive vegetation control.	1. GPS; 2. Field Form; and 3. Camera

1.h.v Waste Monitoring

On 2 June 2014 the National Environmental Management: Waste Amendment Act came into force. With various amendments brought by this amendment, the most significant, and still most controversial change is the blanket inclusion of mine residue stockpiles as hazardous waste under the Schedule 3: Defined Wastes Definitions. Section 4 of the Act has also been amended to remove the previous exclusion of mine residue deposits and stockpiles from the Act's ambit. Mine residue deposits and stockpiles are accordingly no longer governed by the MPRDA, but are subject to all the provisions of the NEM:WA.

Schedule 3: Defined Wastes have been broken down into two categories: Category A being hazardous wastes and category B being general wastes. Under Category a (hazardous wastes) the Act makes allowance for "Wastes resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals".

In order to attempt to understand the implications of this on a mining operation, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles."
- Residue deposits: means "any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right."
- Residue stockpile: means "any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act."

Various regulations have been drafted in support of the NEM:WA, some of which are already in effect, and then there are also those still proposed.

Chapter 9 of the above-mentioned Regulations stipulates the requirements for a motivation for and consideration of listed Waste Management Activities that do not require a Waste Management Licence. The motivation must:

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

The transitional provisions under Chapter 6 of these Regulations prescribe timeframes in which all wastes must be classified within 18 months from the date of commencement of these regulations (23 August 2013) and every five years thereafter or should the process be changed or altered.

For the above purposes, Dwarsrivier Mine must implement and undertake a Waste Classification System in accordance with the NEM:WA

Table 67 to Table 70 presents the monitoring compliance including the responsible persons, implementation period, and mechanism for monitoring compliance.

1.h.vi Air Quality Monitoring

Dust monitoring is undertaken using the latest ASTM standards. Dust monitoring is undertaken at five (5) points around the mine within a 28—31 day schedule:

- DWR001 (School);
- DWR002 (Far North Point);
- DWR003 (Parking Lot South Shaft);
- DWR004 (Discard Storage Facility South Shaft); and
- DWR005 (North Shaft.

Figure 85: Dust Monitoring Locations

The mine is located outside residential areas (non-residential) and should therefore comply with the following limits in terms of the National Dust Control Regulations, 2013:

Restriction Areas	Dust fall rate (D) (mg/m2/day) – averaged over 30 days.	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months.

Non-residential area	D < 1200	Two within a year, not sequential months.

1.h.vii Ecological Monitoring

Through initiating and maintaining a terrestrial monitoring programme, the biodiversity within the Dwarsrivier Mine, comprising the unique and sensitive floral species composition associated with the Sekhukhuneland Centre of Floristic Endemism, with special mention of floral assemblages associated with Sekhukhune Mountain Bushveld, Sekhukhune Bushveld and rivers and associated instream habitat areas, will be protected.

Through maintaining a terrestrial bio-monitoring programme the biodiversity of the landscape, with special mention of sensitive environments and faunal and floral assemblages, can be monitored and information can be provided to adequately manage the biological resources associated with the mining footprint and associated sphere of influence. The broad objective of the biodiversity monitoring programme is to:

- Comply with the Dwarsrivier Safety, Health and Environment (SHE) standards, Environmental Management Programme (EMPr) and Environmental policies;
- Assess the Present Ecological State (PES) of terrestrial ecology within the Dwarsrivier Mine footprint and associated sphere of influence;
- Monitor spatial and temporal trends in biological resource integrity in the vicinity of the Dwarsrivier Mine; and
- Report any emerging issues.

In order to ensure that impact mitigation takes place to an adequate level should the proposed mining expansion proceed, the Biodiversity Action Plan (BAP) must be updated with the additional activities and the relevant management actions which must be undertaken to manage impacts on the ecology of the region in association with other stakeholders in the area whom have an impact on the freshwater resources. The BAP and the implementation of additional management measures must continue to be overseen by an environmental panel which should include representatives from the mine, appropriately qualified specialists as well as local communities and water users in the greater catchment as well as other mines.

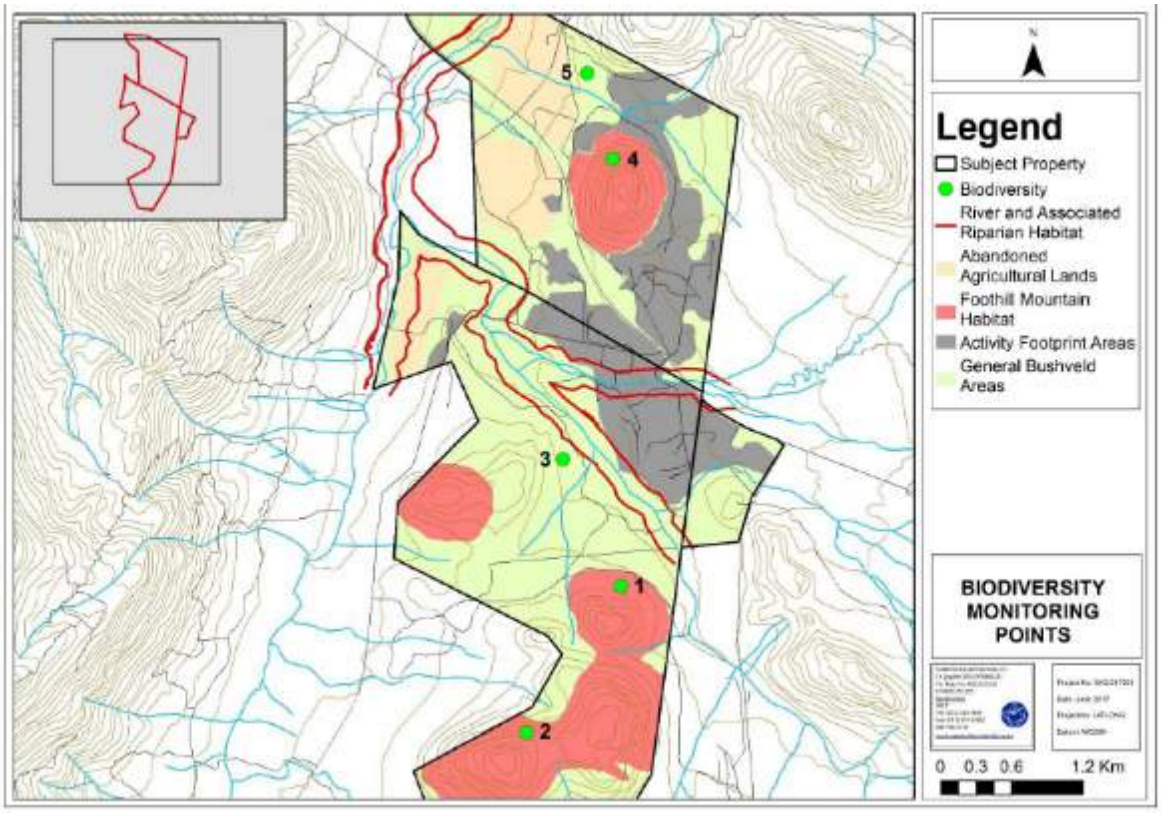

Figure 86: Locations of individual biodiversity monitoring points in relation to the Dwarsrivier Mine

1.h.viii Closure Monitoring

The following monitoring programme is recommended upon closure:

Table 79: Post Closure Monitoring Programme

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	**Frequency / duration**		
Soil Management				
Soil fertility	• Undertake a visual assessment and delineate areas where poor vegetation growth has occurred; • Submit soil samples to an accredit soil laboratory to conduct soil fertility analysis.	Yearly until soil fertility supports the final land use or for at least 5 years post-closure	• Soil analysis results comply with remediation targets at a 95 percentile level; and • Self-sustaining vegetation establishment.	• Apply amelioration where required as informed by sampling undertaken.
Erosion	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site	Twice yearly for at least 5 years post closure.	• No evidence of significant erosion; and • Good vegetation cover and species composition.	As required: • Re-shape areas to ensure that they are free-draining; • Establish vegetation on bare patches; and • Repair and stabilisation of erosion gullies and sheet erosion.
Post-mining end land use	• Assess activities completed, as well as legal and related documentation completed and signed-off; and • Ensure rehabilitation measures are aligned to the LUP.	Once off, at mine closure.	• Area has been rehabilitated to an aesthetic quality not to compromise potential tourism; • Transfer to third party operator has taken place once the area has been proven to be safe for redevelopment; • Legal and zoning issues have been addressed; and • Vegetation re-establishment, cover and composition are sustainable.	• Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Topography	• Conduct a visual assessment to determine areas of potential erosion; and • Undertake regular digital surveys of rehabilitated areas to confirm that final topography is aligned with landform designs.	During rehabilitation phase	• No evidence of significant erosion. • No evidence of water pooling on rehabilitated areas. • The final profile achieved should be acceptable in terms of surface water drainage requirements and the end land use objectives.	As required: • Re-shape areas to ensure that they are free-draining; and • Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	**Frequency / duration**		
Vegetation establishment	○ Determine whether re-established vegetation communities are on a trajectory of achieving a stable self-sustaining community dominated by species typical of the climax-species present in the adjacent areas; ○ Inspect rehabilitated areas to assess vegetation establishment and provide for early detection of erosion in recently planted/seeded areas (monthly); ○ Undertake fixed point photography at specific points at the rehabilitated sites to obtain a long term directly comparable method of determining changes in the landscape; and ○ Conduct evaluation of rehabilitated areas by means of field inspections. During these assessments measurement of growth performance and species abundance will be carried out to determine: i. Plant basal cover and species abundance in the grassed areas. Estimates of vegetation canopy and ground cover as well as height; ii. Distribution, growth and survival of woody species; iii. Dominant plant species (woody and herbaceous); iv. Presence of exotic invasive species, and degree of encroachment; v. Browsing or grazing intensity; vi. Notes regarding erosion, such as, type, severity, degree of sediment build-up; and vii. Species composition and richness.	Quarterly for at least 5 years post-closure.	▪ Limited to no erosion; and ▪ Self-sustaining vegetation ecosystem.	As required: ▪ Revegetate poorly established rehabilitated areas; ▪ Reseed bare patches; and ▪ Apply additional fertiliser and/ or organic matter, depending on the condition of the vegetation and the initial organic material application.
Alien and Invasive floral species	▪ Visually inspect areas where invasive species have been previously eradicated and areas prone to invasive species (e.g. eroded/degraded areas, along drainage lines, etc.); and ▪ Undertake surveys on relevant sites where bush encroachment has previously been identified to determine the status quo of invasive vegetation.	Yearly for at least 5 years post-closure.	▪ Limit and/or prevent declared Category 1, 2 and 3 invader species establishing; ▪ Minimise extended threat to ecosystems, habitats or other species; ▪ Increase the potential for natural systems to deliver goods and services; and ▪ Minimise economic or environmental harm or harm to human health.	▪ Revisit mitigation measures; and ▪ Continue control and management.
General site status	▪ Conduct a visual assessment with respect to compliance of the afore-mentioned closure measures and to ensure that the site is aesthetically neat and tidy, and that no health or safety risks exist on site.	Once-off following implementation of rehabilitation measures.	▪ Waste/rubble free sites.	As required: ▪ Clear remnant rubble and dispose of in open quarry as backfill material.

Component / Aspect	Monitoring		Performance / success criteria	Corrective action
	Methodology	**Frequency / duration**		
Surface Water Quantity	• Visually assess the functionality of the surface water drainage systems feeding surface water runoff from rehabilitated areas. • Undertake field investigations, fixed point photography to document the significance of the erosion occurring on site.	After the first major rains of the season and after any major storm.	• No evidence of significant erosion; and • No evidence of water pooling on rehabilitated areas.	As required: • Re-shape areas to ensure that they are free-draining; and • Refer back to end land use approach and refine measures to be implemented in achieving the desired final land use.
Surface Water and Groundwater Quality	• Sample and monitor surface and groundwater quality.	Quarterly for at least 3 years post-closure.	• Water quality results within ranges of the WUL and/or DWS standards.	As required: • Increase monitoring frequency and detect point sources. • Optimise monitoring plan if needed.
Groundwater Quantity	• Sample and monitor groundwater levels in the vicinity of the mine.	Quarterly for at least 3 years post-closure.	• No evidence of dewatering and lowering of water tables within the vicinity of the mine.	As required: • Increase monitoring frequency and detect point sources. • Optimise monitoring plan if needed.

1.i Monitoring frequency and Responsible person

Please refer to Table 67 to Table 70 for the management actions required. Also refer to Section 1.h for the monitoring programme recommendations.

1.j Period for implementing actions

Please refer to Table 67 to Table 70 for the management actions required.

1.k Mechanisms for monitoring compliance

Please refer to Table 67 to Table 70 for the management actions required.

1.l Indicate the frequency of the submission of the performance assessment report.

Internal Audits

Quarterly internal audits should be undertaken to ensure that the conditions of this EMP are implemented.

External Performance Assessments

It is recommended that the independent external performance assessments be undertaken annually.

The external performance assessments must also include the overall mine assessment of the financial provision and EMP commitment. The report should be submitted to the DMR within 30 days of finalisation.

Other Performance Indicator Assessments

Due to the dynamic nature in which the mine is addressing the water management on site and considering the near-future projects that are planned, the following measure to ensure that performance measures are reached are recommended:

- Ongoing water monitoring in terms of the monitoring protocol.
- Biannual meetings be scheduled with the DWS and/or CMA to discuss the action plan compliance and status.
- Annual update of the IWWMP.
- Annual update of the Water Balance.
- Annual update of the Salt Balance.

1.m Environmental Awareness Plan

1.m.i Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

1.m.i.1 Education and Training

Dwarsrivier Mine is a Sector Education Training Authority's (SETA) accredited training facility. The primary objectives include:

- The availability, in terms of quality, quantity, and employment equity, of the range of skills required to access, extract and beneficiate the ore-body productively and safely, on a sustainable and environmentally responsible basis, inclusive of production, technical, support and administrative competencies
- The skilling of employees in portable competencies, which relate to existence outside the mining environment and which can be applied to sustain individuals and communities once mining careers, are ended
- Increasing the employability of selected people from the local community

1.m.i.2 Internal and External Communication and Awareness Raising

1.m.i.2.a Emergency Response Plan

Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Emergency Response Plan.

This plan should be placed around the mine where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.

If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine.

Dwarsrivier Mine has an Emergency Preparedness and Response Plan in place on site. This plan specifically addresses the following:

- Procedures applicable to all surface areas;
- Procedures applicable to veld fires;
- Procedures applicable to underground fires;
- Damage to a Radio Active source;
- Radioactive source and fires;
- Major fall of ground accidents;
- Major power failure;
- Tailings Dam collapse;
- Flooding in the underground workings;
- Labour unrest;
- Handling petrochemical spills;
- Lightning detector warning alarm within the mining area, surface and underground;
- Safety harness fall rescue plan;
- Rescue and response capability; and
- Management of Emergencies.

1.m.i.2.b Purpose

The purpose of this procedure is to provide guidance to deal with emergencies efficiently and to:

- Ensure the health and safety of all personnel;
- Recover to normal operation as soon as possible;
- Co-ordinate evacuation; and
- Prevent, minimise damage to the environment.

Emergencies Include:

- Environmental Emergencies:
  - Spillages/ Uncontrolled Release over 1000 litre; and
  - Flooding (underground flooding, storm water flooding, overflow of RWDs, break TSF wall).
- Other Emergencies:
  - Uncontrolled fires, which cannot be extinguished by portable extinguishers;
  - Flooding (underground flooding, storm water flooding, overflow of RWDs, break TSF wall);
  - Bomb threats;
  - Strikes;
  - Total power failure;
  - Explosions;
  - Radio Active Sources; and
  - Assaults/ violence.
- Safety and Health Emergencies:
  - Personal injuries;
  - Property damage;

- Dangerous occurrences; and
- Diseases.

1.m.i.3 Communication

1.m.i.3.a Internal and External Communication Systems

A system of information sharing with regulatory authorities and Interested and Affected Parties (I&APs) was developed with the following objectives-

- Keep them updated on environmental management progress at the operations;
- Inform them about new developments at the operation and provide them with an opportunity to express their concerns about these;
- Provide them with a means to discuss environmental matters with the operation whenever necessary;
- Simplify involvement in the processes of updating existing and obtaining new permissions;
- Provide a forum for detailed discussion of issues when necessary.

Basic public involvement principles that need to be applied are as follows-

- Involvement of all I&APs;
- Respect for the opinions of all I&APs;
- True two-way exchange of information, with listening on both sides;
- Follow-up on commitments made;
- Feedback on how concerns expressed by I&APs have been or are being addressed;
- Clear channels of communication;
- Accurate records of every interaction with I&APs, including names and contact details of people involved;
- Accurate records of information exchanged with I&APs – including letters, reports and other documents that were exchanged;
- Records of meetings circulated to I&APs so that they can check that the record of information shared is correct.

For public meetings, the following principles should be applied-

- Advance notice of any meetings (at least 21 days) to allow people sufficient time to attend the meetings;
- Scheduling of meetings with consideration of people's time constraints.

1.m.i.3.b Identification of Stakeholders

Parties that have been involved in information sharing and other types of communication include the following-

- Local residents;
- Business / Industry / Other Mines;
- Community / Development;
- Environmental Services;
- National Authorities-
  - DMR;
  - DWS;
  - LDEDET;
  - Department of Agriculture.
- Provincial authorities include:
  - Olifants River CMA;
  - Department of Agriculture and Land Administration;
  - Provincial Heritage Resources Agency;
  - Department of Public Works;
  - Provincial Administration;
  - Department of Economic Planning and Development;
  - Department of Health and Social Services;
  - Department of Local Government and Housing;
  - Department of Roads and Transport; and
  - Local and District Municipality.

1.m.i.3.c Public liaison and forum participation

No formal public liaison or forum participation exists currently. The Constitutions for water forums in this area have been drawn up during 2005, and are awaiting approval by the Minister of the DWS. The Olifants River CMA was established on 27 February 2015 and the mine is activity involved in consultation with the DWS with the last site visit conducted on 1 November 2017 by the DWS officials. A meeting was also held with the DWS regarding this project on 19 July 2018.

1.m.i.3.d Distribution of information

All information which is required for distribution is being placed on the internet site of Assmang Ltd.

An effective internal communication strategy will be implemented to inform:

- employees of possible retrenchments;
- other affected parties (sending areas, municipalities, etc.) of the possible retrenchments at the operation; and
- Outside parties of the possible retrenchments at the operation.

1.m.ii Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The following protocols must be developed by the mine, in parallel to the actions recommended in Table 67 to Table 71:

- Task/ Issue Based Risk Assessments must be undertaken with all workers involved in the specific task in order to establish an understanding of the risks associated with a specific task and the required mitigation and management measures.
- Environmental emergencies occur over the short term and require an immediate response. A mine, as part of its management tools, especially if it is ISO 9000 and ISO 14001 compliant, should have an Emergency Response Plan. This plan should be placed around the mine where it will be easily viewed. The plan should contain a list of procedures, evacuation routes and a list of emergency contact numbers. It is advisable that the mine tests the emergency response plan in order to identify any areas for improvement.
- If the emergency has the potential to affect surrounding communities, they should be alerted via alarm signals or contacted in person. The surrounding community will be informed, prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.
- Communication is vital in an emergency and thus communication devices, such as mobile phones, two-way radios, pagers or telephones, must be placed around the mine.
- Protocols to be developed should include:
    - Vegetation clearance;
    - Heritage finds procedure;
    - No-go zone requirements;
    - Waste Management procedure;
    - Emergency Preparedness' Procedure;
    - Hydrocarbon Spill Management Procedure;
    - Monitoring Protocol; and
    - Alien Invasive Management and Monitoring Procedure.

1.n Specific information required by the Competent Authority

Dwarsrivier Mine is required to make financial provision for final rehabilitation activities on the site. The Regulations for Financial Provision states in Regulation 8 the following:

8. (1) an applicant or holder of a right or permit must make financial provision by one or a combination of a—

(a) Financial guarantee from a bank registered in terms of the Banks Act, 1990 (Act No. 94 of 1990) or from a financial institution registered by the Financial Services Board as an insurer or underwriter;

(b) Deposit into an account administered by the Minister responsible for mineral resources; or

(c) Contribution to a trust fund established in terms of applicable legislation, on condition that—

(i) this may not be used for the financial provision required in terms of regulations 6(a) or (b) or regulation 11(1)(a) or (b); and

(ii) This may not be used by an applicant for, or holder of, a mining permit in terms of the Mineral and Petroleum Resources Development Act, 2002.

Dwarsrivier Mine, will provide for the closure liability either through a Bank Guarantee as allowed by NEMA.

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

Date

3 UNDERTAKING REGARDING LEVEL OF AGREEMENT

TO BE SIGNED UPON THE FINAL EIA AND EMP REPORT SUBMISSION

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 Report

Background Information Document

Stakeholder Database

Comments received

Minutes of meetings

Annexure 5: Proof of submission to commenting authorities

Scoping Report

EMPr

Annexure 6: Specialist Reports

Soils and Land Capability Study

Ecological Study

Heritage and Paleaontological Study

Floodline Assessment

Groundwater Study

Annexure 7: Financial Provision Study

Annexure 8: Leach studies

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