Application for a Mining Right and Associated Environmental Authorisation and Waste Management Licence (WML) for the proposed mining of granite on a Portion of Zwart Modder Mountain No. 446 (445) in the Kai! Garib Local Municipality, Northern Cape Province

Draft EIA/EMPr Report

DMR Reference Number: NC 30/5/1/2/2/10193 MR

Report Prepared for

Golden Tropic Mining (Pty) Ltd

Report Prepared by

GEOLOGICAL CONSULTING SERVICES PTY (LTD)

November 2021

Title:	*Draft EIA/EMPr Report for Application for a Mining Right and Associated Environmental Authorisation and Waste Management Licence (WML) for the proposed mining of granite on a Portion of Zwart Modder Mountain No. 446 (445) in the Kai! Garib Local Municipality, Northern Cape Province*
Status of report:	*Draft Report*
First Issue:	*November 2021*
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Executive Summary

Introduction

Golden Tropic Mining (Pty) Ltd (Golden Tropic) applied for a Mining Right (MR) (Department of Mineral Resources (DMR) Ref: NC 30/5/1/2/2/10193 MR) for the proposed mining of granite on a Portion of Zwart Modder Mountain No. 446 (445), Northern Cape Province.

The proposed mining project will cover an area of 2 627.28 hectares on a Portion of Zwart Modder Mountain No. 446 (445), which is located approximately ±45km North East of Pofadder in the Northern Cape Province.

Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. Golden Tropic is therefore applying for a MR right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 22 of 2002) (MPRDA) from the Department of Mineral Resources Northern Cape Province (DMR) Regional Office for granite mining on a Portion of Zwart Modder Mountain No. 446 (445). Before the MR will be granted, Golden Tropic must also undertake an Environmental Authorisation (EA) and Waste Management Licence (WML) processes in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM: WA).

The project triggers activities listed in terms of Listing Notice 1, 2 and 3 of the NEMA (as amended) and will require an EA from the DMR. The proposed waste rock dump, residue stockpiles/deposits and waste management facilities will trigger activities listed in GNR 921 (Category A and B) of the NEM: WA and will therefore require a WML from the DMR. An integrated application for an EA and WML will be conducted where a full Environmental Impact Assessment (EIA) including Scoping and Impact Assessment will be followed as stipulated in GNR 326 of the NEMA and GNR921 of the NEM: WA.

Who is conducting the EIA?

Ndi Geological Consulting Services (Pty) Ltd has been appointed by Golden Tropic the independent Environmental Assessment Practitioner (EAP) to conduct the MRA/EA/WML application process for the project.

The reports and documentation for the integrated EA/WML application process will be compiled and finalised for submission to the DMR for the EA/WML in terms of the NEMA for consideration and decision making. The DMR will consult with other government authorities as required in terms of Section 24(K) of the NEMA.

Who will evaluate the EIA?

Before the proposed development can proceed, approval must be obtained from the appropriate regulatory authorities. The Scoping Report and Plan of Study were and accepted by the DMR for review, allowing the current impact assessment phase of the project to proceed. The impact assessment phase entailed detailed specialist investigations, reporting and further stakeholder involvement. Currently the process is in its draft EIA/EMPr Report stage where the draft reports will need to be submitted to the stakeholders for review and comment. Comments received will then be incorporated into the Final EIA/EMPr Report. Only once a Final EIA/EMPr Report has been submitted to DMR can a decision be taken by the Department as to whether the project may proceed or not.

Description of the Proposed Development

The choice of mining method in a dimension stone quarry is largely affected by the geology of the deposit. Boulder formations will largely be quarried by means of splitting methods, especially by means of the use of blasting gunpowder, while solid formations will require the at least some application of one or more cutting methods in order to loosen large benches from the solid formation. In general, in marbles, slates, sandstones

and quartzites mining will be by non-explosive splitting and cutting techniques, while in granites blasting techniques may be applied. The physical properties of the stone are likely to determine what type of explosives will be applied.

Processing will involve cutting and dressing of the granite. There will be no processing taking place on site.

It must be noted that most of the required infrastructure exists already in the area which will require upgrading or expansion only. The infrastructure includes:

- *Access roads: The mining right area is accessed via the N14 road from Kakamas to Springbok which intersects with a secondary road to Onseepkans Settlement. Access and haul roads in the mining area and to the plant have been created.*
- *Electricity: The mine currently makes use of power generators and Eskom electricity to supply power to the workshops, offices and sorting and dressing areas as well as other mining areas.*
- *Water: Mine process and potable water will be abstracted through boreholes and stored on site in 5 000 litre bottles, balancing dams, reservoir and storage dams at the quarries.*

Other existing infrastructure in the mine area include:

- *Quarries*
- *Living quarters*
- *Offices*
- *Workshops*

The MR will be required for ten (10) years.

Motivation for the Proposed Project

The mining industry is of great importance to the South African economy. According to the DMR, in 2004, the total export earnings from granite was approximately R 342 million, with Italy being the greatest single importer of South African granite. International markets for the granite products have already been identified, where the cut granite will be exported from the Cape Town harbour where they will be further cut. Locally the product is being sold at the mine.

The mineral extraction of granite is considered by Golden Tropic to be in the best interest of the public at large by generating earning power both locally and internationally, and as well as creating significant alternative employment opportunities in the area.

Alternatives Considered

The alternatives considered were as follows:

- *Location: The location of the open cast mine and underground mining area is constrained to the location of the mineral resource, and proven reserve. The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. As such, the site is therefore regarded as the preferred site and alternatives are not considered.*
- *Type of Activity: An alternative to the type of activity would be agriculture and mining. The land use alternatives will be investigated in more detail in the impact assessment phase of the process.*

- *Design or Layout of the Activity: The design or layout of a mining project is determined by the shape, position and orientation of the mineral resource. Best practice dictates that it is better to mine and rehabilitate the area sequentially in mining blocks, as this minimises the disturbance to the mining blocks once they have been rehabilitated. The significance of the environmental impacts associated with different possible design or layout alternatives would be very similar. However, the significance of the impacts will be investigated in depth during the impact assessment phase of the project.*
- *The Technology to be used in the Activity: The technology used in a mining project is determined by the shape, position and orientation of the mineral resource. This mining operation can be classified as quarrying the open or surface excavation of granite. Quarrying starts from the earth's surface and maintains exposure to the surface throughout the extraction period. For both access and safety, the excavation usually has stepped or benched side slopes. Quarrying methods depend mainly on the desired size and shape of the stone and its physical characteristics and the main equipment used are diamond saws (Rotary saws). An alternative would be wire saws.*
- *The Operation Aspects of the Activity: The operational plan for the mine is based on the international demand per granite colour. The road access routes proposed will need to be negotiated with the landowners affected by the MRA and the conclusions from the negotiations will be included in the Draft EIA Report.*
- *No-go Option: The no-go alternative would entail not mining the granite and leaving the landuse in the area as agriculture and mining. Should the proposed mining development not take place, it entails that the land will continuously be used for agriculture and mining, depending on the landowners needs and desirability for the future. Agriculture is undoubtedly one of the most important sectors in South Africa, with agriculture contributing to Kai !Garib's, as is noted in the LM's IDP, Northern Cape Province and South Africa's Gross Domestic Product (GDP), but not nearly as much as the mining sector.*

  By not implementing this project the local economic and employment opportunities and revenue as well as the mined granite which could potentially have benefitted the economy would be lost.

  The socio-economic impacts of no implementing the project include local, regional and more than likely national impacts:

  - *Local and regional: planned socio-economic initiatives within the surrounding communities would not be able to go ahead; and*
  - *National: Loss opportunities in foreign exchange for South Africa will be incurred as the potential to sell the granite internationally will be lost.*

  Although not fully assessed at this time, the additional potential negative impacts on the environment associated with granite mining would not exist should the project not be implemented. The environmental, social and economic impacts will be assessed in detail during the impact assessment phase to identify and address all negative impacts, where possible.

All the identified alternatives will be assessed in detail in the specialist studies and impact assessment phase.

Environmental Impact Assessment Process

An EIA seeks to identify the environmental consequences of a proposed project from the beginning, and helps to ensure that the project, over its life cycle, will be environmentally acceptable, and integrated into the surrounding environment in a sustainable way. The project triggers activities listed in Listing Notice1, 2 and 3 of the NEMA and Category A and B of GNR921 of the NEM: WA and requires that a full EIA (scoping and impact assessment phases) be conducted.

A summary of this process is shown in Figure ES-1.

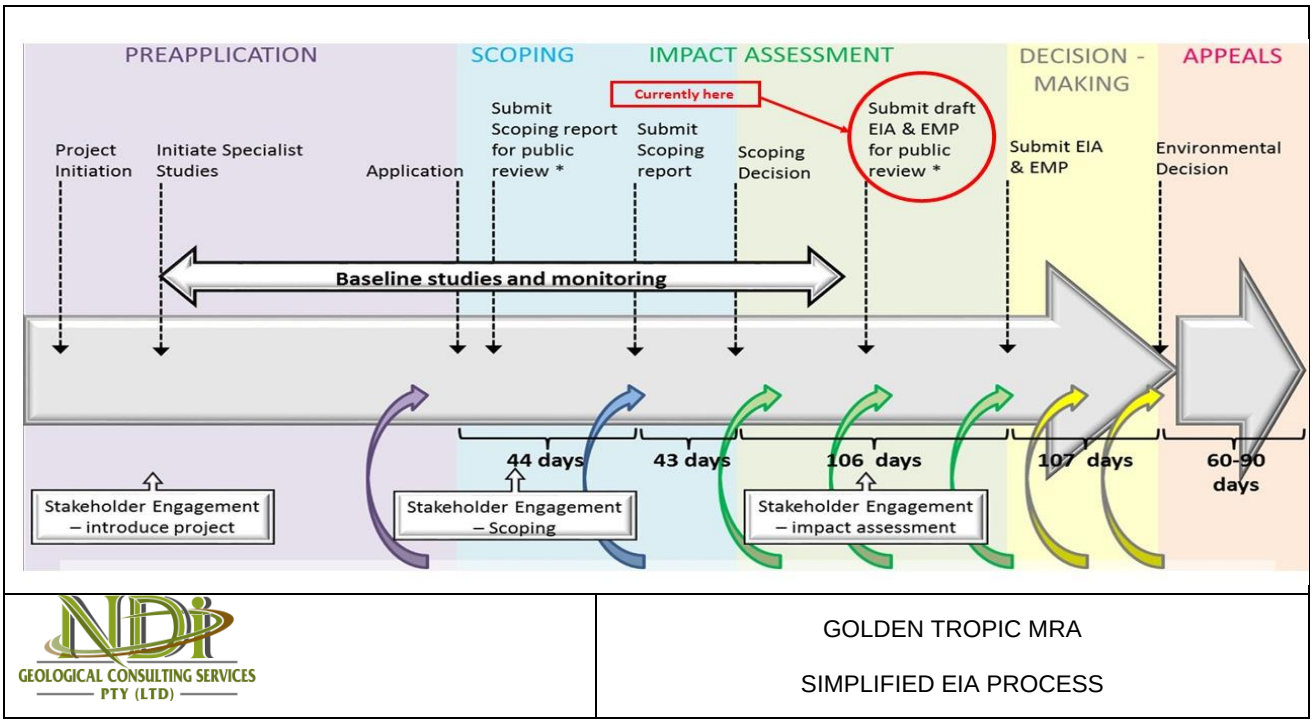

Figure ES-1: Illustration of the EIA process to be followed

Stakeholder Engagement Process

Activities that have been undertaken for the public involvement process during the scoping phase are:

- *Identification of Interested and Affected Parties (I&APs) and development of a stakeholder database: I&APs were identified using GIS and cadastral information to identify affected and adjacent properties. The affected and adjacent property owners were identified using the surveyor general website, www.deedsweb.gov.za. In addition, registered I&APs were also sourced from responses to the advertisements, site notices and written notification to I&APs associated with the project. The I&APs register will be maintained for the duration of the study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs will be an on-going activity.*

The opportunity to participate in the EIA and to register as an Interested and Affected Party (I&AP) was announced through the following means:

- *Letter of invitations to register and background information documents;*
- *Newspaper advertisements;*
- *Site notices erected at several places in and around the proposed prospecting area;*
- *Collation of comments received into the comments and responses table; and*
- *Obtaining and documenting registration and comment sheets.*

The Draft Scoping Report was made available for a 30-day commenting period. All issues, comments and suggestions received from stakeholders have been reviewed and collated into the comments and responses register in Section 10.1.6. Where necessary, comments from stakeholders were incorporated into the Final Scoping Report that was submitted to the DMR for decision making. One on one key stakeholder discussions were held with the adjacent landowners during the scoping phase of the project where the stakeholders were provided with a brief description of the proposed project and were provided with an opportunity to comment

and raise issues that may need to be included in the impact assessment phase. All comments received have been incorporated into the final Scoping Report.

During the EIA phase, stakeholder engagement will entail:

- *Notification of the availability of the Draft EIA/EMPr Report for review and comment;*
- *The 30-day review and comments period between 15 November 2021 and 15 December 2021;*
- *Public Meeting to be held at the Pofadder Hotel on 20 November 2021; and*
- *Updating of the comments and responses table.*

The stakeholders will be notified of DMR's final decision on the project once it has been communicated to the EAP and applicant (Golden Tropic).

Profile of the receiving environment

The scoping report provides a general description of the status quo of the receiving environment in the project area. It serves to set the scene and provide context to the area within which the scoping exercise was conducted. This section also includes the main issues/impacts associated with each aspect and how the proposed project will affect the biophysical and social environment. A summary of the main baseline aspects is included in Table ES-1, with more detail included in Section 11 of the report

Table ES-1: Summary of the Profile of the Receiving Environment

Aspect	***Description***
Geographical	*The proposed project area is situated in the Kai !Garib Local Municipality's area of jurisdiction, within the ZF Mgcawu District Municipality, Northern Cape Province. The project is located approximately 45km North East of Pofadder.*
Topography	*The 20 m contours show that the north-eastern section of the project site has a flatter gradient compared to the north-western, south western and south-eastern sections*
Climate	*The climate is continental and is little affected by the ameliorating influences of the oceans.* • *The highest maximum temperature is experienced during December, January, February and March where the average maximum goes beyond 32 °C.* • *The coldest months of the year are June and July, where the average temperature drops well below 10 °C.* • *The highest rainfall months are January to February with an average of ±20mm; and* • *The dry months are June and September with an average of below 5mm.*
Geology	*The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology. The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colors of the granite vary from terra-cotta red through pinkish to dark grey.*
Land use and land capability	*The current landuse on the affected properties is farming and mining.*

Aspect	***Description***
Biodiversity	*The proposed mining area is located in the Nama Karoo Biome. The Nama Karoo Biome is a vast, open, arid region dominated by low-shrub vegetation and abundance of rock. Although not remarkably rich in species or endemism, the flora and fauna of the region are surprisingly adapted to its climatic boundaries. The major pressure to biodiversity is posed by overgrazing farm animals, introduction of alien species of plants, mining and conversion of native habitat to agriculture. In this biome the temperatures can vary dramatically between day and night times. This biome is dominated by low growing shrubs. Reptiles and small invertebrates are common.* *The proposed mining area is located in the Bushmanland Bioregion. The Bushmanland Bioregion occurs from the north-eastern part of the Namaqualand area in the west to around Prieska in the east and from around Upington in the north to the Brandvlei/Sak River vicinity in the south.* *According to the SANBI remaining vegetation types database, there is no remaining natural vegetation on the affected area.* *The proposed site is associated with ecosystems that are considered to be threatened. The threatened ecosystems associated with the site are the Bushmanland Arid Grassland, Blouputs Karroid Grassland and Lower Gariep Broken Veld.*
Heritage Resources	*Heritage resources may be tangible, such as buildings and archaeological artefacts or intangible such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical scientific, social, spiritual, linguistic economic or technological values; their representation of a particular period; their rarity and their sphere of influence. There are a number of heritage and cultural resources in the Northern Cape Province.* *A site-specific Heritage Impact Assessment (HIA) will be conducted where potential impacts on heritage resources will be assessed in the impact assessment phase of the project and mitigation measures to be implemented in the event that heritage and cultural resources are encountered will be included in the EMPr*
Noise	*The MRA area is located in a rural area and the typical noise rating in the area is expected to be that for rural districts / suburban districts with little road traffic. According to SANS 10103:2008, the continuous noise rating level is thus likely between 35 dB(A) at night to 45 /50 dB(A) during the day.*
Wetlands	*The SANBI data shows that there are no wetlands occurring on the study area.*
Conservation Plan	*According to the Northern Cape Provincial Biodiversity Conservation Plan (C Plan), a portion of the affected property is classified as a Critical Biodiversity Area (CBA (areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan).* *The Namakwa District CPlan shows that a portion of the affected area is classified as an Ecological Support Area (ESA). Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas (CBAs) and/or in delivering ecosystem services.*
Protected Areas	*There are no protected areas or important bird areas affected by the proposed prospecting activities.*

Aspect	*Description*
Surface water	*The project is located within quaternary catchments, which include C81E (located within the Lower Orange Water Management Area (WMA). The Samoep River and several tributaries and drainage lines traverse the project area. The Samoep River is not considered a Freshwater Ecosystem Priority Area (FEPA).*
Groundwater	*According to the DWS National Groundwater Archives the groundwater in the area is classified as follows:* • *Groundwater Recharge is considered low, between 0 and 1 000mm/yr. This is expected due to the dry and hot climate in the area.* • *Groundwater Quality area is generally of poor quality, with Electrical Conductivity (EC) levels between 300 and 1 000 mS/m.* • *Groundwater Yield in the project area is low and is between 0.1 and 0.5l/s and that the aquifer is intergranular and fractured /s*

Anticipated Impacts

Risks and potential impacts were categorised according to the type of activity undertaken and the relation to each environmental variable. Findings from specialist studies were incorporated into this EIA/EMPr Report. The following impacts as described in Table ES-2 are anticipated because of the construction, operation and decommissioning phases of the project:

Table ES – 2: Anticipated Impacts

Element of Environment	*Potential Impact Descriptions*
Socio-Economic	*Possible job opportunities during the construction and operation.*
Hydrogeology	*Possible groundwater contamination.*
Surface water	*Possible surface water contamination.*
Aquatic ecosystems and riparian areas	*Possible impacts on aquatic ecosystems and riparian areas*
Air Quality	*Possible impact on Air Quality in the area.*
Climate Change	*Possible contribution to climate change through emission of Green House Gases*
Blasting and vibrations	*Possible impacts on private properties and fauna due to blasting and vibrations*
Noise	*Possible generation of noise during construction and operation.*
Soils/Land Use/Land Capability	*Loss of soil resource and change in land capability and land use.*
Biodiversity	*Disturbance and loss of biodiversity, especially SCC.*
Aquatic ecology	*Possible loss, sedimentation and contamination of aquatic resources*
Heritage	*Possible impact on heritage and cultural resources (including graves) in the area.*
Traffic	*Potential safety issues due to the increased traffic.*
Cumulative Impacts	*Cumulative Impacts*

Specialist Studies

Specialist studies contained in the Scoping Report and Plan of study were conducted to assess the anticipated impacts. All specialists assessed the impact (including cumulative) of each proposed activity/aspect in relation to the construction, operation, closure and decommissioning phases and developed appropriate mitigation measures that can be implemented to reduce or eliminate the potential impacts identified.

Quantification of Impacts

The anticipated impacts associated with the proposed project were assessed according to Ndi Geological Consulting Services (Pty) Ltd.'s standardised impact assessment methodology which is presented in Section 12. This methodology has been utilised for the assessment of environmental impacts where the consequence (severity of impact, spatial scope of impact and duration of impact) and likelihood (frequency of activity and frequency of impact) have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact.

Summary of the Impact Assessment Process

This section contains the assessment of potentially positive and negative environmental impacts that could possibly be caused by the proposed mine.

The impacts are linked to the activities conducted for the proposed development, broadly relating to construction, operational and decommissioning phases. Specific emphasis was placed on any relevant environmental, social and economic impacts identified by the specialist studies, comments received during the stakeholder engagement process, issues highlighted by relevant authorities; as well as professional judgement of the EAP team through appraisals on the project description, listed activities and the environment.

The objectives for each of the potential environmental impacts identified was to determine their significance and to identify mitigation measures that may be implemented to reduce the impacts to an acceptable level where required.

The impacts evident from the detailed impact assessment (Section 13) of the proposed project are both positive and negative in nature.

Key Positive Impacts After Mitigation

The main positive impacts identified for the project relate to socio-economic impacts that the construction and operation of proposed mine will have. The proposed mine will result in the mining activities at the proposed granite mine for 10 years. These impacts were determined to have a positive impact, either directly or through the spinoffs generated by the development and operation of the proposed project and associated infrastructure. These positive impacts are not listed per phase of the project, but as consolidated impacts during construction, operation and closure

In terms of local economy, there is the potential for multiple significant benefits to both local and regional businesses, as well as local employment opportunities. This would be highest during the construction phase, due to the requirement of contractor numbers (for services and materials). This has opportunities for both the formal and informal sectors, as smaller enterprises, including spaza shops, are likely to be established during the construction period to supply contractors and others with food and other amenities.

The assessment of the current economic state in the municipality, the profile of the zone of influence, and the project itself showed that the mine has created numerous positive impacts and is likely stimulating the local economy. The proposed mining activities will ensure that the LM and communities in the area benefit from the mine. The stimulation of the national economy will occur as a result of the investment into the mine. The subsequent benefits are employment creation, a rise in consumption levels, new business sales, and a contribution to GDP.

It is expected that the mine will continue to implement a policy allowing for preferential procurement for the local businesses and training of local Small, Medium and Micro-sized Enterprises (SMME) on procurement and business management.

The mine is expected to have a positive socio-economic benefit through employment of locals. Recruitment of labour will be guided by Golden Tropic's recruitment policies which are expected to promote the employment

of local labour by the mine as well as by any appointed contractors. Golden Tropic will ensure that a transparent process of employment will be followed to limit opportunities for conflict that may arise.

The proposed mine will use recruitment to meet the targets as set forth in the SLP. A projected total of 88 employees are envisaged to be employed at the mine. Where specialist and skilled labour is recruited from outside the local boundaries due to the skills scarcity, local residents will benefit through on the job training, where possible.

The skills programmes to be applied during mining operations at mine are considered to be holistic, given that they cover qualification attainment, basic education provision, on the job training, etc. If implemented accordingly, the skills levels particularly of the local community will improve and thus enable employees to acquire future employment.

Key Negative Impacts After Mitigation

The assessment found that there are a number of negative impacts that are expected as a result of the proposed granite mine. The most significant impacts identified were on the biodiversity, groundwater and surface water resources. Granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

The biodiversity assessment found that the proposed mining infrastructure will negatively impact on the floral communities within the area. the proposed mining area falls in the Bushmanland Arid Grassland which is classified as Least threatened. According to the SANBI, the proposed site is classified as a Critical Biodiversity Area 2 and Ecological Support Area, this implies that the proposed site plays a role in meeting biodiversity targets for ecosystems, species and ecological processes as identified in a systematic biodiversity plan. The proposed site has suffered minor veld transformation because of historic mining activities; however it is still in a good ecological state. These sites were found to incorporate protected trees species that will need to be considered during the planning and construction phase of the proposed activities. They also provide ecosystem services for both fauna and flora onsite. In addition, some medicinal plants were found on the property including Aloe greatheadii used medicinally for the treatment of wounds, sores and burns and Aloe marlothi used by the Zulus for roundworm infestations and by other cultures for stomach problems and horse sickness. Some of the sensitive species that can occur onsite may be affected by the proposed development (such as Euphorbia spinea and Galenia africana). These species are protected under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development.

Other negative impacts identified include:

- *Socio – Economic: Transportation of material to and from the study area will result in additional trucks and construction vehicles on the study area roads, which can cause damage to the road surface and*

increase the potential for accidents in the area. The influx of additional people looking for employment will result in impacts on the social dynamics in the area.

- *Groundwater Impacts: Local spillages of hydrocarbons and chemicals used during the pre-construction and construction phase which may leach to groundwater. There is potential for leakages, spillages and percolation of groundwater contaminants from infrastructure including the waste management facilities, waste rock dump area and the residue stockpiles/deposits areas.*
- *Surface Water: Movement and use of vehicles and machinery as well as improper storage of hazardous substance may have Impacts on surface water and groundwater quality due to accidental spillages of hazardous substances. Contaminated dirty water runoff from the mining area to surrounding areas resulting in the impact on local surface water quality. The removal or containment of dirty water will result in the removal of MAR from the catchment, as this runoff will now be considered dirty water and will need to be contained within the mining area.*
- *Air Quality Impacts: The movement of vehicles in the area will have an impact on ambient air quality as follows:*
    - *Possible increase in dust generation, PM10 and PM2.5 as a result of bulk earthworks, operation of heavy machinery, and material movement.*
    - *Increase in carbon emissions and ambient air pollutants (NO2 and SO2) as a result of movement of vehicles and operation of machinery/equipment.*
- *Visual Impacts due to:*
    - *Visual intrusion as a result of the movement of machinery and the erection of contractor camps;*
    - *Scaring of the landscape as a result of the clearance of vegetation and preparation of the mine areas; and*
    - *Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.*
- *Noise Impacts: The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity. Mining activities will result in an increase in ambient noise levels as a result of the mining activities*
- *Soil, Land Use and Land Capability: The proposed project is expected to have impact on land capability which will generally be limited since there currently are other anthropogenic activities in the area. The soil has already been significantly altered by other activities and the potential of this land to be used for agriculture after rehabilitation is very limited. The granite mining areas will result in permanent loss of land capability and result in a permanent change in landuse of the footprints of the quarry areas. There is potential for chemical potential pollution of soils due to use of vehicles and machinery and storage of hazardous material at the mine. Other impacts include:*
    - *Clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion;*
    - *Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint;*
    - *As a result of construction activities, the land use will have altered from grazing and agriculture to that of construction for mining activities;*
    - *Handling and storage of building materials and different kinds of waste leading to soil sterilisation.*

- *Heritage Impacts: The heritage resource assessment found no heritage resources and areas of archaeological importance as provided in Section 10.10. It must however be noted that there is a possibility that some heritage resources, especially graves, may have been missed during the assessment. These heritage resources may not be relocated or destroyed without written approval from the SAHRA. Implementation of mitigation measures included in Section 13 will result in the reduction of the significance of the impact, if any, ion heritage resources.*
- *Palaeontology Impacts: Sealing-in or destruction of the fossils during earth moving activity. Implementation of the mitigation measures in the specialist studies report and Section 13 of this report will reduce the potential for loss of fossils.*

Closure and Decommissioning

The residual risk associated with the proposed project will largely relate to water management and rehabilitation following the operational phase. The rehabilitation of the mining area as well as the latent water influx will need to be managed to as to prevent any residual impact in years following decommissioning. These monitoring requirements have been addressed in the EMPr.

The main impacts that will result from the closure phase will relate to the ineffectiveness of the construction and operational phases to eradicate alien vegetation, which will ultimately result in the loss of indigenous fauna and flora. In addition, the decommissioning activities may further impact on the established vegetation in the area, resulting in the loss of biodiversity species, habitats and ecological structure. All the impacts that may result from the decommissioning activities of the proposed project have been effectively addressed in the impact assessment in Section 13.3, as well as the EMPr.

Environmental Management Programme

An EMPr has been developed as part of this EIA to ensure the mitigation of these impacts as far as practicable. It is anticipated that it will be possible to mitigate most of the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented. The EMPr is considered adequate to assist the project in striving towards the principles of the NEMA.

Golden Tropic will be responsible for ensuring that all environmental obligations pertinent to the proposed project are met. The implementation of the EMPr and the meeting of the environmental objectives and targets is also the responsibility of Golden Tropic.

Conclusion and Recommendation

Ndi Geological Consulting Services (Pty) Ltd has undertaken the EIA and EMPr for the proposed granite mining by Golden Tropic in accordance with the requirements of the NEMA and National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA). This has included a comprehensive stakeholder engagement process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in the project process and guide technical investigations that have taken place as part of the Impact Assessment Phase of this study. Specialist input has been included for all key environmental aspects that were identified during the scoping phase of the process.

Granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in

environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO2 and NOX), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements.

The findings of the impact assessment have shown that the proposed project will have negative impacts on the receiving environment, including:

- *Land use change;*
- *Reduction in catchment yields as dirty water runoff within the mine;*
- *Loss of floral species and species diversity;*
- *Loss and fragmentation of habitat of faunal species and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;*
- *Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the mine;*
- *Groundwater loss and flow from the quarry will also contribute toward baseflow reduction; and*
- *Nuisance noise, dust and visual impacts.*

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium and low significance, including:

- *Ensuring the layout of the mining infrastructure does not impact on the water resources and regulated 100m buffer area without approval from the DWS;*
- *Ensuring the layout of the mining infrastructure does not impact on the heritage resources without approval from SAHRA;*
- *Stormwater management plan must be developed and implemented;*
- *Re-vegetation of the rehabilitated areas with indigenous species;*
- *Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project;*
- *Develop and implement a biodiversity management plan; and*
- *The land use and the overall land capability as the soil can be rehabilitated to be reused for grazing and crop farming purposes.*

Monitoring plans, which should be implemented throughout the life of the mine, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

With the correct and effective mitigation and management measures, including the protection of wetlands located outside the footprints of the mining areas and infrastructure, the mining operations are feasible.

Furthermore, the indirect impacts from the proposed development could cause negative impacts on the surrounding natural environment, unless this is also managed and monitored in order to address adverse impacts immediately. Rehabilitation must be implemented based on best practice principles and the DMR, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed mine.

An EMPr has been developed as part of this EIA to ensure the mitigation of these impacts as far as practicable. It is anticipated that it will be possible to mitigate the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented. The EMPr is considered adequate to assist the project in striving towards the principles of the NEMA.

The project team believes that the EIA undertaken for the proposed granite mining project fulfils the process requirements of the NEMA and the NEM: WA. The EAP recommends that an EA/WML be issued by the DMR and that the construction and operation of the mine should be conducted under duty of care and must be in accordance with the recommendations that were included in this EIA/EMPr Report as well as conditions that will be included in the EA/WML by the DMR.

YOUR COMMENT ON THE EIA/EMPr REPORT

This Draft EIA/EMPr Report will be available for comment for a period of 30 days from 15 November 2021 to 15 December 2021. Copies of the EIA/EMPr Report have been made available at the following public places for review

Public Place	Locality	Telephone
Ndi Geological website	http://www.ndigeoservices.co.za/	053 842 0687

An electronic copy will also be available on CD on request from the stakeholder engagement officers. I&AP's are requested to provide comments and information on the following aspects of the proposed project:

1. Information on how I&AP's consider that the proposed activities will impact on them or their socio-economic conditions;
2. Written responses stating their suggestions to mitigate the anticipated impacts of each activity;
3. Information on current land uses and their location within the area under consideration;
4. Information on the location of environmental features on site to make proposals as to how and to what standard the impacts on site can be remedied; and
5. How to mitigate the potential impacts on their socio-economic conditions and to make proposals as to how the potential impacts on their infrastructure can be managed avoided or remedied.

DUE DATE FOR COMMENT

15 December 2021

Please submit comments to the EAP:

Ndivhudzannyi Mofokeng
Ndi Geological Consulting Services (Pty) Ltd
38 Ophelia Street
Kimberley, 8301
Cell: 082 760 8420
Tel: 053 842 0687
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ndi@ndigeoservices.co.za

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to Ndi Geological Consulting Services (Pty) Ltd by Golden Tropic Mining (Pty) Ltd (Golden Tropic). The opinions in this Report are provided in response to a specific request from Golden Tropic to do so. Ndi Geological Consulting Services (Pty) Ltd has exercised all due care in reviewing the supplied information. Whilst Ndi Geological Consulting Services (Pty) Ltd has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. Ndi Geological Consulting Services (Pty) Ltd does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of Ndi Geological Consulting Services (Pty) Ltd.'s investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which Ndi Geological Consulting Services (Pty) Ltd had no prior knowledge nor had the opportunity to evaluate.

List of abbreviations

CA:	Competent Authority
CRR:	Comments and Responses Register
DEFF:	Department of Environment, Forestry and Fisheries
DMR:	Department of Mineral Resources
DMS:	Dense Media Separation
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
EAP:	Environmental Assessment Practitioner
EIA:	Environmental Impact Assessment
EIAR:	Environmental Impact Assessment Report
EMPr:	Environmental Management Programme
EMPr:	Environmental Management Programme
GDP:	Gross Domestic Product
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plan
IWUL:	Integrated Water Use Licence
LM:	Local Municipality
Mamsl:	meters above mean sea level
MPRDA:	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
NEM: WA:	National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
NEMA:	National Environmental Management Act, 1998 (Act 107 of 1998)
NFEPA:	National Freshwater Ecosystems Priority Areas
PAIA:	Promotion of Access to Information Act (Act No. 2 of 2000)
PHRA:	Provincial Heritage Resources Agency
PoS:	Plan of Study
PPE:	Personal Protective Equipment

PVC:	Polyvinyl chloride
SAHRA:	South African Heritage Resources Agency
SCC:	Species of Conservation Concern
SDF:	Spatial Development Framework
WMA:	Water Management Area
WML:	Waste Management Licence

mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

FOR LISTED ACTIVITIES ASSOCIATED WITH THE PROPOSED MINING OF GRANITE ON THE PORTION OF ZWART MODDER MOUNTAIN NO. 446 (445) IN THE KAI !GARIB LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE

SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS 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	Golden Tropic Mining (Pty) Ltd
TEL NO	082 572 4274
FAX NO:	053 832 5018
POSTAL ADDRESS	48 Aviva Road, Hillcrest, Kimberley, 8301
PHYSICAL ADDRESS	48 Aviva Road, Hillcrest, Kimberley, 8301
FILE REFERENCE NUMBER SAMRAD	NC 30/5/1/2/2/10193 MR

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 evaluation 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 a 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 identify residual risks that need to be managed and monitored._____

1 Project background

Golden Tropic Mining (Pty) Ltd (Golden Tropic) applied for a Mining Right (MR) (Department of Mineral Resources (DMR) Ref: NC 30/5/1/2/2/10193 MR) for the proposed mining of granite on a Portion of Zwart Modder Mountain No. 446 (445), Northern Cape Province.

The proposed mining project will cover an area of 2 627.28 hectares and is located approximately ±45km North East of Pofadder.

Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. Golden Tropic is therefore applying for a MR right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 22 of 2002) (MPRDA) from the Department of Mineral Resources Northern Cape Province (DMR) Regional Office for granite mining on a Portion of Zwart Modder Mountain No. 446 (445). Before the MR will be granted, Golden Tropic must also undertake an Environmental Authorisation (EA) and Waste Management Licence (WML) processes in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Waste Act (Act No. 59 of 2008) (NEM: WA).

The Department of Forestry and Fisheries and the Environment (DFFE) has identified the need for the alignment of environmental authorisations and has promulgated a single environmental management system under NEMA whereby the DMR has become the competent authority for the authorisation of mining-related projects under the NEMA Environmental Impact Assessment (EIA) Regulations. This will result in simultaneous decisions in terms of NEMA and other environmental management Acts. The competent authority for the EA/WML process is the DMR.

Golden Tropic appointed Ndi Geological Consulting Services (Pty) Ltd (Ndi Geological) as the independent Environmental Assessment Practitioner (EAP) to facilitate the EA/WML process for the proposed granite mining project.

Before an EAP submits a final report, they must have given registered I&APs access to, and an opportunity to comment on the report prior to the submission of the final report to the competent authority for approval. The registered I&APs were provided with an opportunity to review and comment on the draft Scoping Report for 30 days. The registered I&APs will be provided with an opportunity to review and comment on the draft Impact Assessment Report once the Scoping Report has been finalised and approved by the DMR.

The reports and documentation for the integrated EA/WML application process will be compiled and finalised for submission to the DMR for the EA/WML in terms of the NEMA for consideration and decision making. The DMR will consult with other government authorities as required in terms of Section 24(K) of the NEMA.

2 Purpose and context of this document

The project triggers activities listed in terms of Listing Notice 1, 2 and 3 of the NEMA (as amended) and will require an EA from the DMR. The proposed waste rock dump, residue stockpiles/deposits and waste management facilities will trigger activities listed in GNR 921 (Category A and B) of the NEM: WA and will therefore require a WML from the DMR. An integrated application for an EA and WML will be conducted where a full Environmental Impact Assessment (EIA) including Scoping and Impact Assessment will be followed as stipulated in GNR 326 of the NEMA and GNR921 of the NEM: WA.

An Environmental Impact Assessment (EIA) is defined as the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made. The aim of the EIA is to prevent substantial damage to the environment. The objectives of this study are:

- To comply with the requirements of NEMA and NEM: WA and associated Regulations;
- Identify and assess the environmental (biophysical, socio-economic, and cultural) impacts of the construction, operation and closure of the proposed project. The cumulative impacts of the proposed development will also be identified and evaluated;
- Identify and evaluate potential management and mitigation measures that will reduce the possible negative impacts of the proposed development and enhance the positive impacts;
- Compile monitoring, management, mitigation and training needs in the EMPr; and
- Provide the decision-making authorities with sufficient and accurate information in order to make a sound decision on the proposed development and set conditions that must be adhered to.

2.1 Integrated Environmental Authorisation and Waste Management Licence Application Process

The first phase of the EA/WML application process was the Scoping Phase, which informed the Impact Assessment Phase. The Scoping Phase provided Interested and Affected Parties (I&APs) an opportunity to provide the EAP with issues and concerns with respect to the proposed project in order to inform the technical studies that were evaluated in this EIA phase of the project.

The Scoping Report provided a guide to the EIA process and specialist studies by:

- Providing an overview of the legal requirements with regard to the proposed project, the proposed project description and anticipated environmental and social issues and impacts that were further investigated in this impact assessment phase; and
- Setting out the scope of the EIA process and the Terms of Reference (ToR) for specialist studies (where applicable) and outlining the approach and methodologies to be used in the EIA process, e.g. the proposed impact rating methodology. The Scoping Report was submitted to the DMR for approval.

The EIA Phase entails the following:

- Incorporating specialist findings into the Draft EIA/EMPr as per the approved Plan of Study contained in the Scoping Report;
- Conducting a quantitative impact assessment;
- Compiling the EMPr; and
- Stakeholder Consultation

Stakeholder engagement is a key element of the environmental decision-making process, and stakeholder engagement formed part of the Scoping Phase and forms part of the Impact Assessment Phase as described in Section 9.

Figure 2-1 provides an illustration of the proposed EIA process that is being followed.

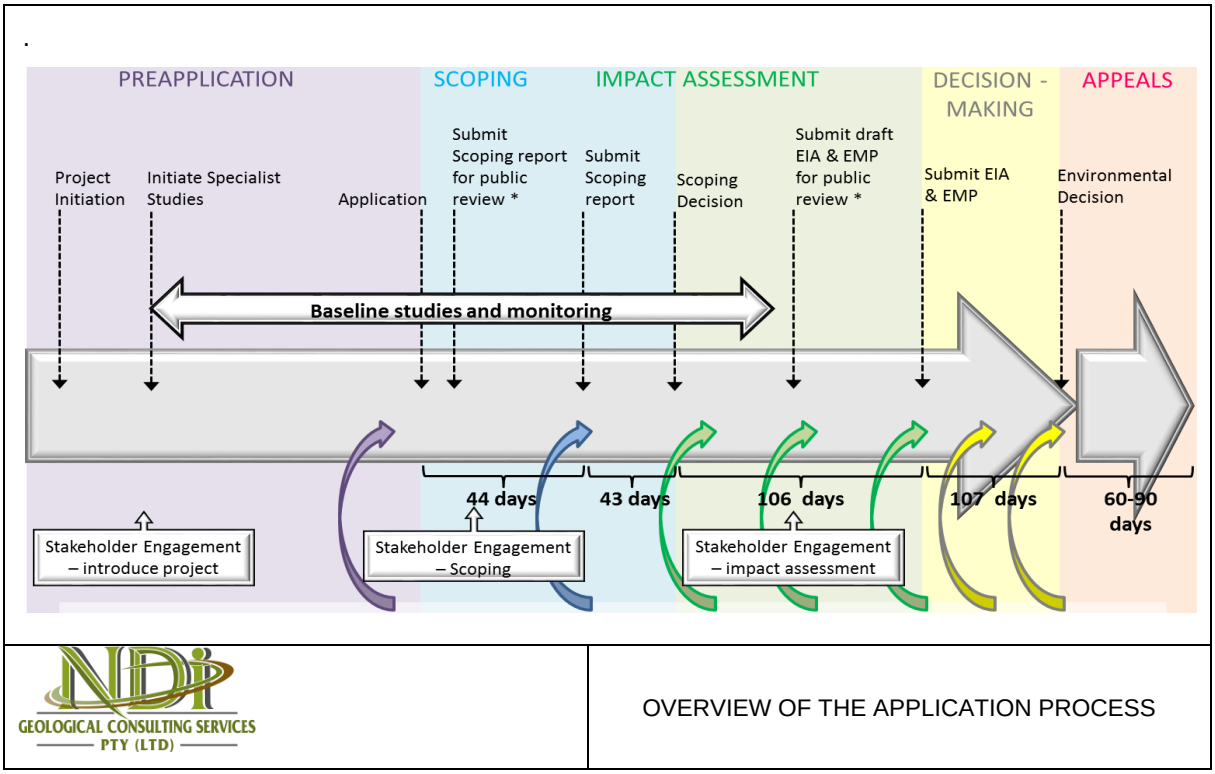


Figure 2-1: Overview the Environmental Impact Assessment Process

2.2 Report Index in Relation to the NEMA Regulations

Regulation 2, Appendix 3 of GNR 982 published in terms of NEMA stipulates the minimal requirements and issues that need to be addressed in the EIA. This report strives to address all these requirements as per regulations. Table 2-1 indicates the regulations that have been addressed and the section of the EIA where these requirements can be found.

Table 2-1: Requirements of Appendix 3 of Regulation 2 of GNR 982

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA	Section
Appendix 3 (a)	Details of – the EAP who prepared the report; and the expertise of the EAP, including a curriculum vitae.	Section 3
Appendix 3 (b)	The location of the activity, including – The 21 digit Surveyor General code of each cadastral land parcel; Where available, the physical address and farm name; Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties.	Section 4

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA	Section
Appendix 3 (c)	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	Figure 5-1 Figure 5-2
Appendix 3 (d)	A description of the scope of the proposed activity, including – All listed and specified activities triggered; A description of the activities to be undertaken, including associated structures and infrastructure.	Section 5
Appendix 3 (e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Section 6
Appendix 3 (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 7
Appendix 3 (g)	A motivation for the preferred development footprint within the approved site.	Section 8
Appendix 3 (h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	
	Details of the development footprint alternatives considered;	Section 8
	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 9
	A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 9.4
	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 10
	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated.	Section 13
	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 12
	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects;	Section 13

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA	Section
	The possible mitigation measures that could be applied and level of residual risk;	Section 13
	If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;	Section 15
	A concluding statement indicating the preferred alternative development location within the approved site.	Section 16
Appendix 3 (i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including- a description of all environmental issues and risks that were identified during the environmental impact assessment process; and an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 17
Appendix 3 (j)	An assessment of each identified potentially significant impact and risk, including- cumulative impacts; the nature, significance and consequences of the impact and risk; the extent and duration of the impact and risk; the probability of the impact and risk occurring; the degree to which the impact and risk can be reversed; the degree to which the impact and risk may cause irreplaceable loss of resources; and the degree to which the impact and risk can be mitigated.	Section 13 Section 17.1
Appendix 3 (k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report.	Section 18
Appendix 3 (l)	An environmental impact statement which contains- i. a summary of the key findings of the environmental impact assessment; ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Section 19
Appendix 3 (m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation.	Section 20

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for EIA	Section
Appendix 3 (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Section 21
Appendix 3 (o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Section 22
Appendix 3 (p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 23
Appendix 3 (q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 24
Appendix 3 (r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	Section 25
Appendix 3 (s)	An undertaking under oath or affirmation by the EAP in relation to: i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and I&APs; iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and iv. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	Section 26
Appendix 3 (t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.	Section 27
Appendix 3 (u)	An indication of any deviation from the approved scoping report, including the Plan of study, including- v. any deviation from the methodology used in determining the significance of potential; vi. environmental impacts and risks; and vii. a motivation for the deviation.	Section 28
Appendix 3(v)	Any specific information that may be required by the competent authority.	Section 29
Appendix 3(w)	Any other matter in terms of Section 24(4)(a) and (b) of the NEMA.	Section 30

3 Contact Person and Correspondence

Ndi Geological Consulting Services (Pty) Ltd has been appointed by Golden Tropic as the independent Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation process and associated stakeholder engagement process to meet the requirements of NEMA and NEM: WA.

3.1 Details of EAP who prepared the report

The EAP involved in the compilation of this Scoping Report and contact details are provided in Table 3-1.

Table 3-1: EAP Contact Details

EAP Name	Contact Number	Fax Number	Email Address
Ndivhudzannyi Mofokeng	082 760 8420/ 053 842 0687	086 538 1069	atshidzaho@gmail.com ndi@ndigeoservices.co.za

3.2 Expertise of the EAP

3.2.1 Qualifications of the EAP

The qualifications of the EAP are provided for in Table 3-2 below, and copies of the qualifications are provided in Appendix B.

Table 3-2: EAP Qualifications

EAP Name	Qualifications	Professional registration	Years' Experience
Ndivhudzannyi Mofokeng	BSc (Hons) Earth Sciences in Mining and Environmental Geology	EAPASA Reg Number 2020/1554 GSSA Prof Reg	11

3.2.2 Summary of EAPs past experience

The EAP, Mrs Ndivhudzannyi is a registered EAP (EAPASA Reg Number 2020/1554) and a GSSA registered geologist with a BSc (Hons) Earth Sciences in Mining and Environmental Geology. She has close to 11 years' experience in the exploration and open cast work in the mining industry. She has proven leadership skills from supervising exploration rigs (Reverse Circulation and percussion drilling). She has proven working experience in field exploration and mapping, borehole logging, borehole sampling, sample preparation for laboratory analysis, handling of GPS, supervisory duties within the field, geological report and progress report writing, including Prospecting Work Programmes and Environmental Management Plans, handling the DMR documents in general.

Please refer to Appendix 2 for a copy of the EAP's Curriculum Vitae and Professional Registration Certificate.

4 Project Location

4.1 Property Description

The description of the affected property is provided in Table 4-1 and map showing the affected property is provided in Figure 4-1.

Table 4-1: Description of Properties affected by the Project

Farm Name:	Portion of Zwart Modder Mountain No. 446 (445)
Application area (Ha)	2 627.28 ha
Magisterial district:	Kenhardt District Municipality
Distance and direction from nearest town	Approximately 45km North East of Pofadder.
21-digit Surveyor General Code for each farm portion	C03600000000044600000

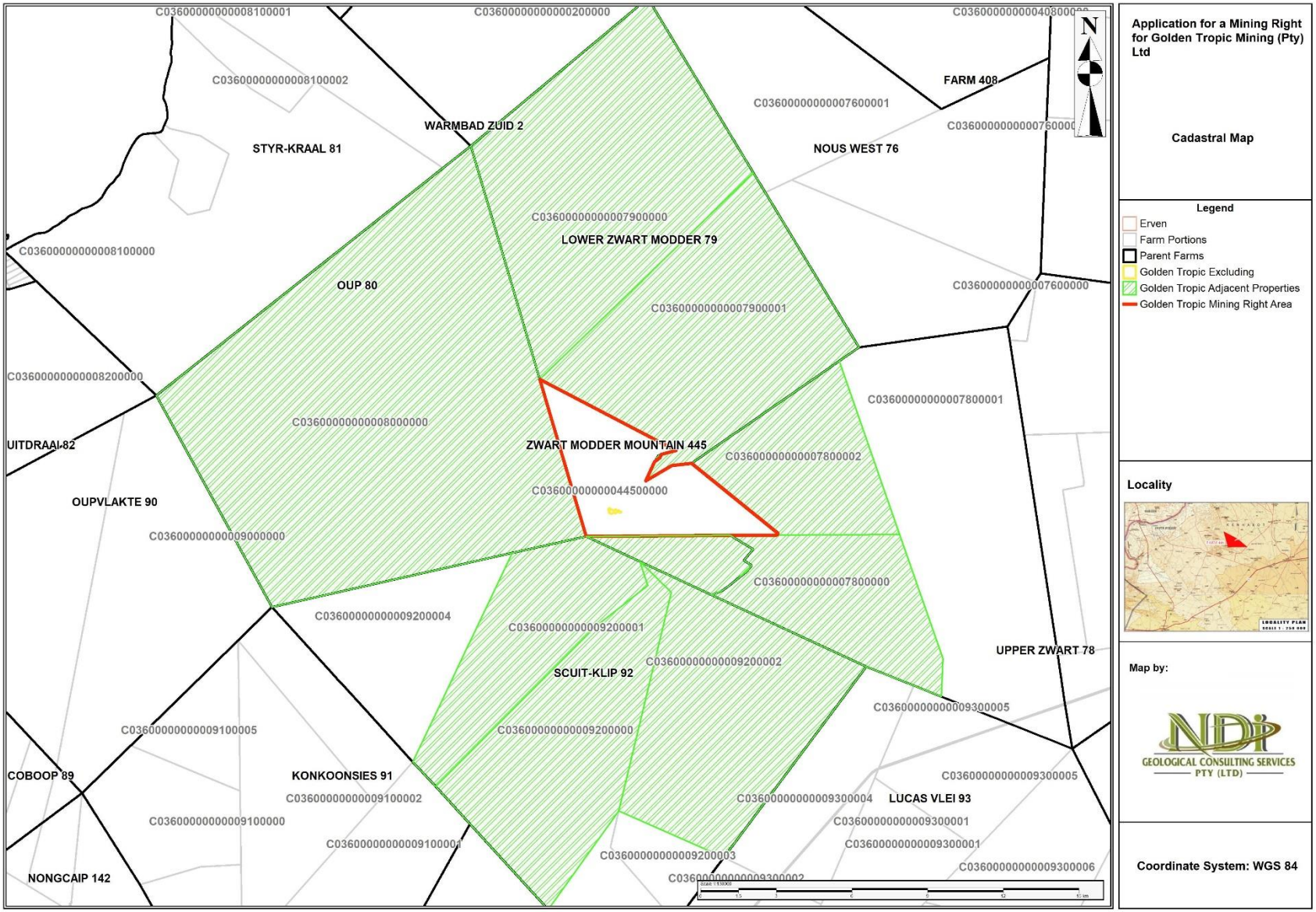


Figure 4-1: Cadastral Map

4.2 Locality map

The proposed granite mining project is located in the Northern Cape Province of South Africa, approximately 45 km North East of Pofadder.

A copy of the locality map is provided in Appendix 3.

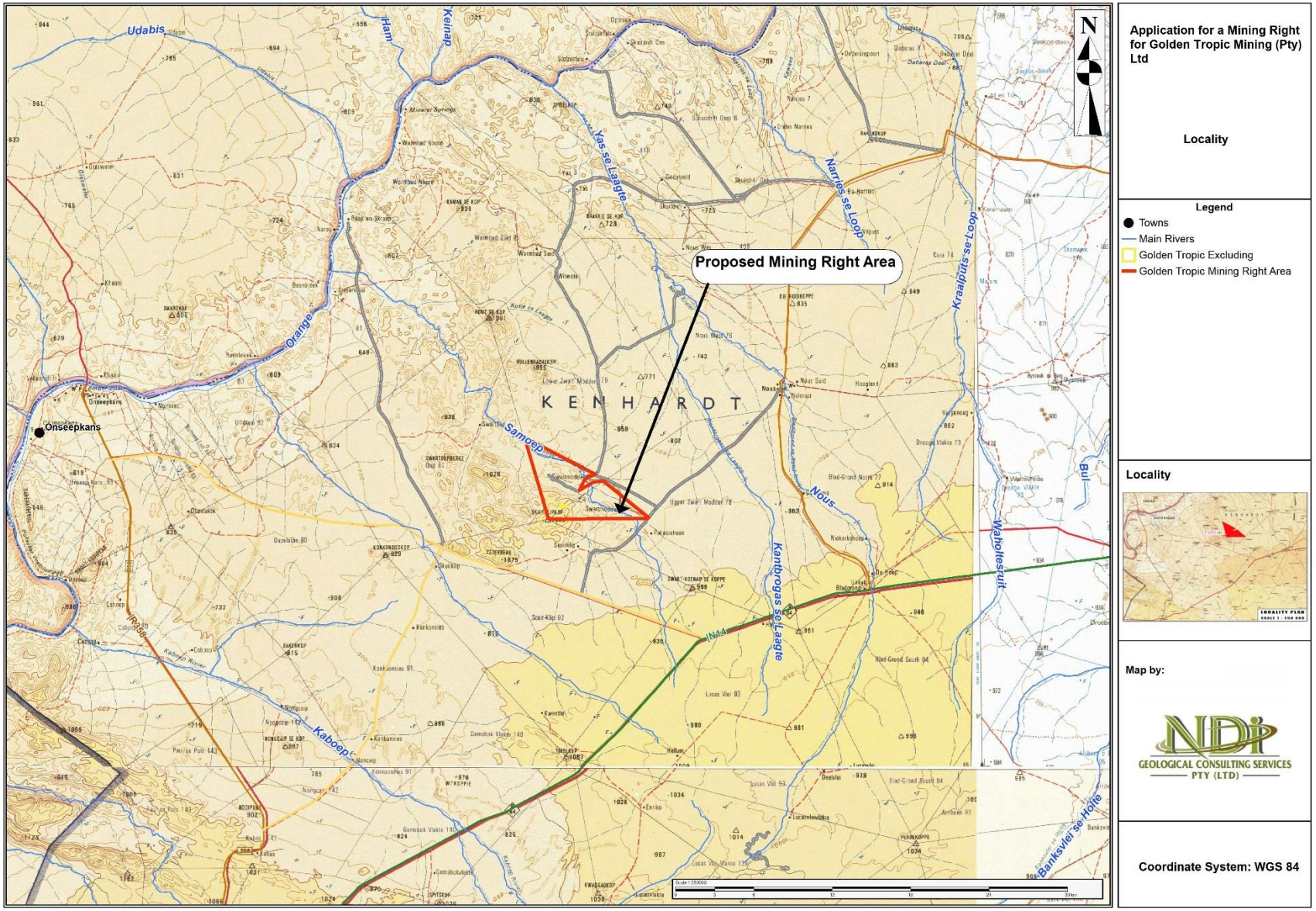
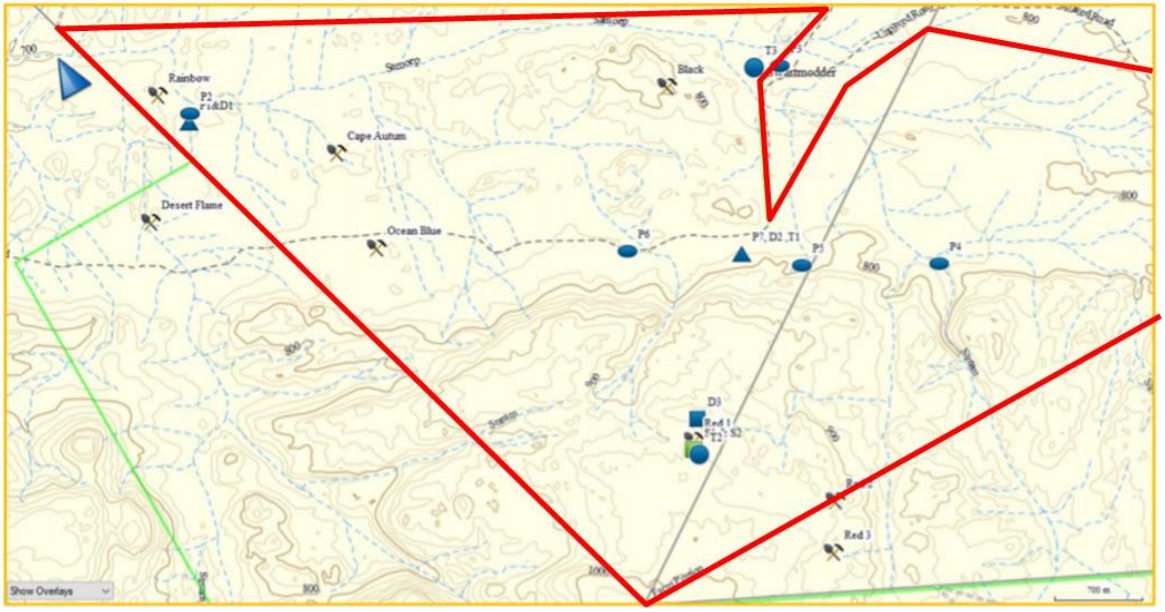


Figure 4-2: Locality Map

5 Project description

5.1 Overview

The choice of mining method in a dimension stone quarry is largely affected by the geology of the deposit. Boulder formations will largely be quarried by means of splitting methods, especially by means of the use of blasting gunpowder, while solid formations will require the at least some application of one or more cutting methods in order to loosen large benches from the solid formation. In general, in marbles, slates, sandstones and quartzites mining will be by non-explosive splitting and cutting techniques, while in granites blasting techniques may be applied. The physical properties of the stone are likely to determine what type of explosives will be applied. The mine design map is provided in Figure 5-1.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)

MINE DESGN MAP

Figure 5-1: Mine design map

5.2 Mining Operations

The choice of mining method in a dimension stone quarry is largely affected by the geology of the deposit. Boulder formations will largely be quarried by means of splitting methods, especially by means of the use of blasting gunpowder, while solid formations will require the at least some application of one or more cutting methods in order to loosen large benches from the solid formation. In general, in marbles, slates, sandstones and quartzites mining will be by non-explosive splitting and cutting techniques, while in granites blasting techniques may be applied. The physical properties of the stone are likely to determine what type of explosives will be applied.

Quarrying method will be used to mine granite where a block of stone is cut free from the bedrock mass by first separating the block on all four vertical sides, and then undercutting or breaking the block away from the bedrock. If the block is large, it is called a “quarry block” and will be cut into smaller blocks at the quarry. If the block is small enough to be moved from the quarry it is called a “mill block” and may be sold as it is or taken to a mill for further processing.

Rock commonly has two, and sometimes three, natural directions of cleavage, which influence both quarrying and rock dressing methods. The direction of easiest cleavage is called the “rift,” the second easiest is the “grain,” and the third and most difficult, if present, is the “head grain” or “run.” If there is no head grain, the third rectangular direction is called the “hardway.” Modern technology and quarrying methods are less dependent on cleavage than were earlier methods.

Two of the oldest methods for quarrying are channel cutting and drilling and broaching. A channelling machine cuts a channel in the rock using multiple chisel-edged cutting bars that cut with a chopping action. In drilling and broaching, a drilling tool first drills numerous holes in an aligned pattern. The broaching tool then chisels and chops the web between the drill holes, freeing the block. Both channel cutting and drilling and broaching are slow, and the cutting tool requires frequent sharpening. Both methods have generally been replaced with other more efficient methods.

Line drilling or slot drilling is a more modern technique for quarrying, which consists of drilling a series of overlapping holes. The drill is mounted on a quarry bar or frame that aligns the holes and holds the drill in position.

Flame cutting or jet channelling is a common method for cutting granite. Flame from a torch is passed over the rock and the intense heat creates a thermal shock, which causes the rock to spall. This technique does not work in quartz-free rocks, or carbonate rocks that fuse or calcine. Jet channelling creates a wide irregular kerf, which wastes rock; it is also very loud, which is a potential health hazard to workers. Channels can also be cut into rocks using a water jet. A high-pressure pulsating jet of water is directed at the rock, which causes it to disintegrate.

A variety of saws can be used to excavate dimension stone, including wire saws, belt saws, and chain saws. The introduction of synthetic diamond tools during the 1960s revolutionized stone working. Chain saws or belt saws with diamond-set teeth are used to cut softer stones such as marble, sandstone, and slate. Wire saws with diamond-impregnated beads mounted on a wire cable can cut harder stones like granite.

5.3 Infrastructure Requirements

It must be noted that most of the required infrastructure exists already in the area which will require upgrading or expansion only. The infrastructure includes:

- Access roads: The mining right area is accessed via the N14 road from Kakamas to Springbok which intersects with a secondary road to Onseepkans Settlement. Access and haul roads in the mining area and to the plant have been created.
- Electricity: The mine currently makes use of power generators and Eskom electricity to supply power to the workshops, offices and sorting and dressing areas as well as other mining areas.
- Water: Mine process and potable water will be abstracted through boreholes and stored on site in 5 000 litre bottles, balancing dams, reservoir and storage dams at the quarries.

Other existing infrastructure in the mine area include:

- Quarries;
- Living quarters;
- Offices; and
- Workshops.

5.3.1 Access Roads

The mining right area is accessed via the N14 road from Kakamas to Springbok which intersects with a secondary road to Onseepkans Settlement. Access and haul roads in the mining area and to the plant have been created (Figure 5-2).

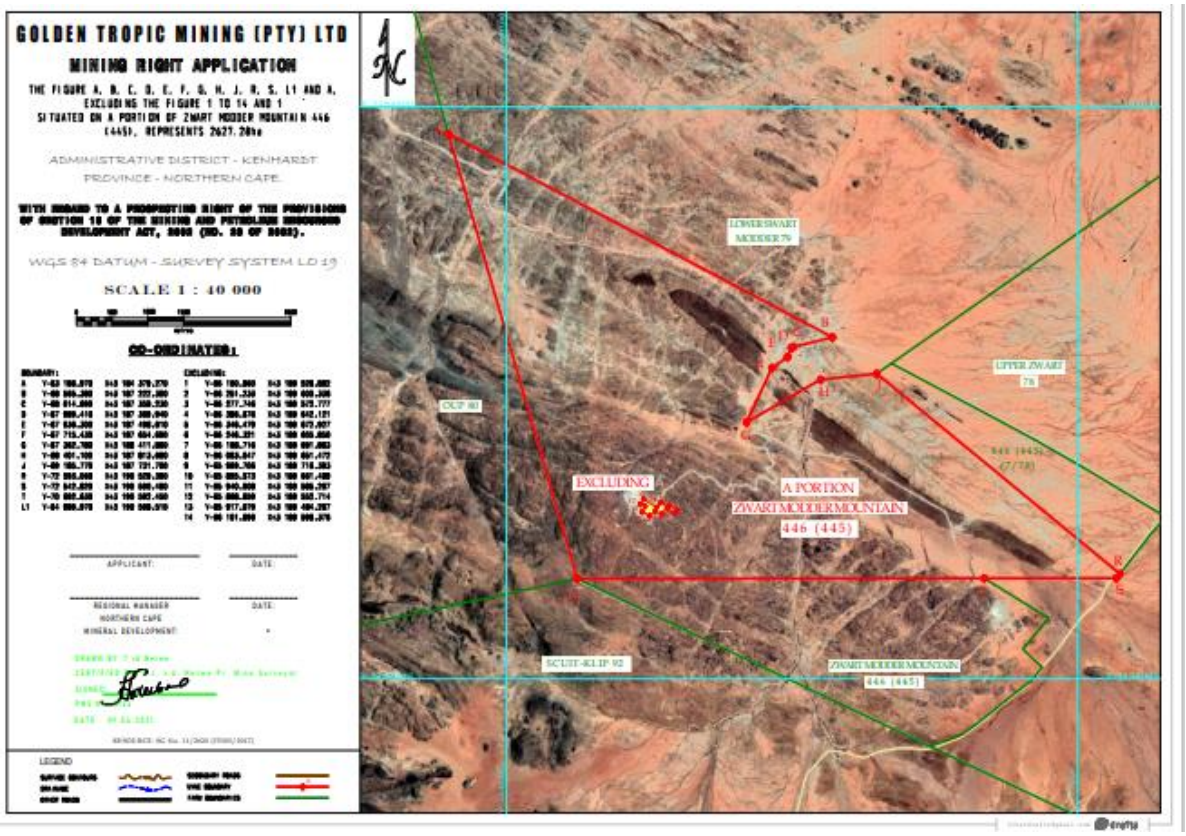


Figure 5-2: Road Network in project area

5.3.2 Electricity

The mine currently makes use of power generators and Eskom electricity to supply power to the workshops, offices and sorting and dressing areas as well as other mining areas. All the equipment to be used during the mining process is diesel powered.

5.3.3 Water

Water will be required for domestic purposes and processing purposes. Water requirements will be met as follows:

- Water for domestic purposes will be obtained from boreholes around the mine and freshwater pumps and stored in plastic tanks.
- Water required for processing will be consist of recycled water and from groundwater abstraction.
- Process water will be recycled as much as possible to provide for both domestic and processing needs.

Table 5-1 provides the estimated water requirement calculation based on all quarries and all living quarters being developed within the next 5 to 10 years.

Table 5-1: Estimated water requirement calculation

Quarry	Water requirement m³/day		Obtain From Pump No/Name
	Domestic	Process	
Rainbow, Cape Autum, Desert Flame, Ocean Blue & Black	*		P1 Cape Autumn (Kudu)
2 Circular saws		10	P2 Cape Autumn
2 Wire saws		3	P3 HQ Pump
Red 1, Red 2 & Red 3	*	30	P4 Red Solar Pump
6 Circular saws			P6 Blue Pump
			P7 Balacing Dam pump
HQ Living quarters (LQ)	2	0	P5 Fresh Water Pump
			P3 HQ Pump
Cape Autumn Living quarters (LQ)	2	0	P5 Fresh Water Pump
Red Living quarters (LQ)	2	0	P5 Fresh Water Pump
Pink	*	10	P10 Pink Solar pump
2 Circular saws			P8 Pink pump 1
			P9 Pink pump 2
Pink Living quarters	2	*	P10 Pink Solar pump
TOTAL	8	53	

Storage of water will include plastic tanks, reservoir D1, balancing dam and storage dams.

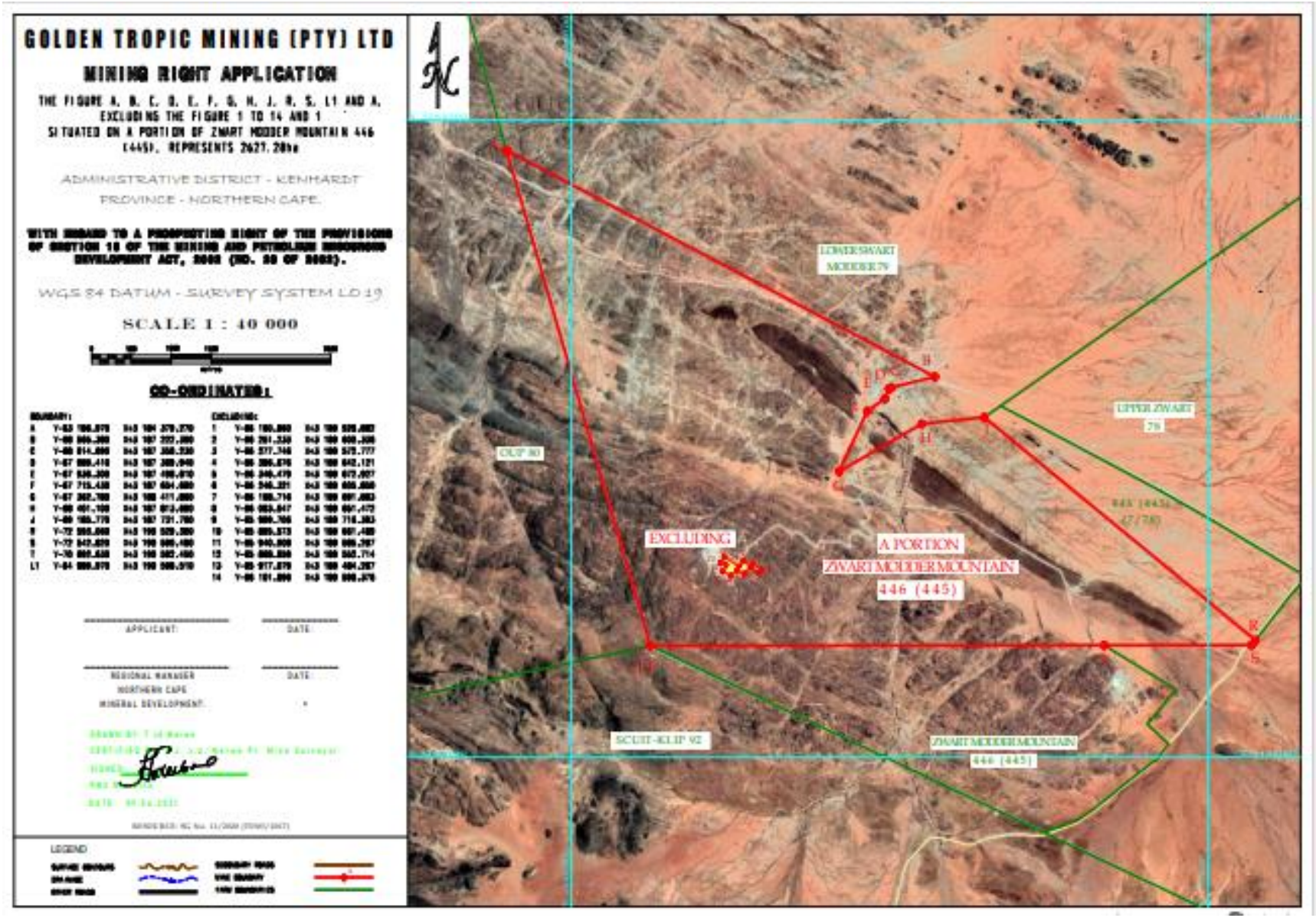


Figure 5-3: Mining Right Application Area- Regulation 2.2 Map

5.4 Listed and specified activities

Section 16 of the MPRDA requires, upon request by the Minister that an Environmental Management Programme (EMPr) be submitted, and that the applicant must notify and consult with Interested and Affected Parties (I&APs). Section 24 of the NEMA requires that listed activities, which may potentially affect the environment negatively, must obtain an environmental authorisation from a relevant authority before the activities may commence.

Such activities are listed under the EIA Regulations (2014 which has been amended in 2017) and consist of:

- EIA Process (Government Notice Regulation (GNR) 982);
- Listing Notice 1 GNR 983 – Basic Assessment process,
- Listing Notice 2 GNR 984 – Scoping and EIA process;
- Listing Notice 3 GNR 985 – Activities in specific identified geographical areas only.

GNR 982, 983, 984 and 985 have been amended in 2017 through GNR 324, 325, 326 and 327, respectively.

The purpose of these regulations is to avoid negative impacts on the environment, and where these cannot be avoided, ensure the mitigation and management of the impacts to acceptable levels, while optimising positive environmental impacts.

The proposed project triggers activities listed in NEMA Listing Notice 1, 2 and 3 as provided in Table 5-2.

Table 5-2: Applicable Activities

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Mining Right Application	2 627.28 ha	X	GNR 984 as amended by GNR 325: Activity 17	[redacted]
Roads and Electrical Supply (already in place)	N/A	[redacted]		
Upgrade existing accommodation and office precincts and structures	Less than 5ha	X	GNR 983 as amended by GNR 327: Activity 27 GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	
Vegetation Clearance for site establishment and infrastructure including: dressing areas, dispatch yards accommodation and logistics areas. areas for compressors and generators	>20ha	X	GNR 983 as amended by GNR 327: Activity 27 GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR	

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
			324: Activity 12 g (iv)	
Upgrade or construct new workshop	±0.5ha	X	GNR 983 as amended by GNR 327: Activity 27 GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	
Hydrocarbon storage	Less than 30m³			
Establishment of Waste Rock Dump	±3.5ha	X	GNR 983 as amended by GNR 327: Activity 27 GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	X Category B (8, 9)
Residue Stockpiles/Deposits	>0.5ha	X	GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	GNR 921 Category B (10)
Waste Management Facilities	>0.5ha	X	GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	GNR 633 Category B (11)
Construction, expansion or decommissioning of waste management facilities and associated structures and infrastructure	>0.5ha	X	GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	GNR 921 Category A (14)
Stockpiling of topsoil	>0.05ha	X	GNR 983 as amended by GNR 327: Activity 27 GNR 983 as amended by GNR 327: Activity 28: GNR 985, as amended by GNR 324: Activity 12 g (iv)	

NAME OF ACTIVITY	Aerial extent of the Activity Ha or m²	LISTED ACTIVITY	APPLICABLE LISTING NOTICE	WASTE MANAGEMENT AUTHORISATION
Transportation of material and ore	N/A			

6 Policy and legislative context

Table 6-1 lists the applicable legislation, policies and guidelines identified as relevant to the proposed project. In addition, a description of how the proposed activity complies with and responds to the legislation and policy context, is provided. This list is not exhaustive but rather represents an indication of the most applicable pieces of legislation relevant to the project.

Table 6-1: Policy and Legislative Context of Proposed Project

Legislation	Description and Relevance	Authority
Constitution of the Republic of South Africa, (No. 108 of 1996)	Chapter 2 – bill of rights Section 24 – Environmental Rights The proposed activities shall be conducted in such a manner that significant environmental impacts are avoided, where significant impacts cannot all together avoided be minimised and mitigated in order to protect the environmental rights of South Africans	N/A
Promotion of Access to Information Act (Act No. 2 of 2000) (PAIA	The Promotion of Access to Information Act (Act No. 2 of 2000) (PAIA) recognises that everyone has a right of access to any information held by the state and by another person when that information is required to exercise or protect any right. The purpose of the Act is to promote transparency and accountability in public and private bodies and to promote a society in which people have access to information that enables them to exercise and protect their right. The EIA/EMPr process to be undertaken in terms of the NEM: WA, NEMA and where required, the NWA, where the associated stakeholder consultation process will be aligned with the PAIA in the sense that all I&APs will be given an opportunity to register as an I&AP prior to the initiation of the project and all registered stakeholders will in turn be provided a fair opportunity to review and comment on any reports submitted to the competent authorities for decision making.	N/A
Minerals and Petroleum Resources Development Act 28 of 2002	The Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) makes provision for equitable access to and sustainable development of South Africa's mineral resources. The MPRDA requires that the environmental management principles set out in NEMA shall apply to all mining operations and serves as a guideline for the interpretation, administration and implementation of the environmental requirements of NEMA. The MPRDA requires that a reconnaissance permission, prospecting right, mining right, mining permit, retention permit, technical corporation permit, reconnaissance permit, exploration right, production right, prospecting work programme; exploration work programme, production work programme, mining work programme, environmental management programme, or an environmental authorization issued in terms of the National Environmental Management Act, 1998, as the case may be, may not be amended or varied (including by extension of the area covered by it or by the addition of minerals or a share or shares or seams, mineralized bodies, or strata, which are not at the time the subject thereof) without the written consent of the Minister.	Department of Mineral Resources, Northern Cape Province

Legislation	Description and Relevance	Authority
	Section 22 of the MPRDA as amended by Section 18 of Act 49 of 2008 The proposed project requires a Mining Right from the DMR.	
National Environmental Management Act (NEMA) (No. 107 of 1998)	Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment) Section 28 – Duty of care and remediation of environmental damage Environmental management principles will be incorporated into the EIA and EMPr, which the applicant will be required to comply with to ensure that negative impacts on the environment are avoided or kept to a minimum and that positive impacts are enhanced.	
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the EIA Regulations 2014 (Government Notice (GN) 984), as amended	The EIA Regulations (GNR 982) were promulgated in terms of Sections 24 of the NEMA, to manage the process, methodologies and requirements for the undertaking of an EIA. The GNR 982 stipulates that the applicant for activities listed under GNR 983, 984 or 985 must appoint an independent EAP to manage the EIA process. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental impact on the environment, and which may not commence without an EA from the Competent Authority (CA). EA required for Listed Activities is subject to the completion of either a Basic Assessment (BA) process or full Scoping and Environmental Impact Assessment (S&EIA) with applicable timeframes associated with each process. The EA must be obtained prior to the commencement of those listed activities. The project triggers activities listed in Listing Notices 1, 2 and 3 and will require an EA from the DMR. According to GNR 326 of the NEMA, activities listed in Listing Notice 2 require that a full S&EIA be undertaken. The applicable listed activities that will be triggered by the project is provided in Table 5-2.	
Department of Environmental Affairs (DEA) Integrated Environmental Management Guideline Series, Guideline 5: Assessment of the EIA Regulations, 2012 (Government Gazette 805)	Environmental impacts will be generated primarily in the construction phase of this project with associated operational phase impacts. These will be assessed as part of the EIA process.	
Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004	A full EIA (scoping and impact assessment) is required for the proposed project as activities are triggered under Listing Notice 2.	

Legislation	Description and Relevance	Authority
Review in Environmental Impact Assessment, Integrated Environmental Management, Information Series 13, Department of Environmental Affairs and Tourism (DEAT), Pretoria.		
DEA Integrated Environmental Management Guideline Series, Guideline 7: Public Participation in the Environmental Impact Assessment Process, 2012 (Government Gazette 807)	Public participation is a requirement of the Scoping/EIA Process and will be conducted for the proposed project as stipulated in Chapter 6 of the NEMA.	
National Water Act, 1998 (Act 36 of 1998)	There is a drainage line that traverses the project area, should any prospecting activities and/or infrastructure be located within 100m of the drainage line, a Section 21 (c&i) IWUL will be required. **21 (c) & (i):** Impeding, diverting and altering the flow of water in a watercourse. Altering the bed, banks, course or characteristics of a watercourse: All activities taking place within 100 m of a watercourse will be licensed under Section 21 c and i	Department of Water and Sanitation (DWS), Northern Cape
National Environmental Management Waste Act (Act No. 36 of 1998)	It is expected that activities listed in GNR921 (Category A and B) will be triggered for the waste rock dump, waste management facilities and residue stockpiles/deposits and will require a waste management licence. Table 5-2 provides a list of GNR921 activities triggered by the project.	DMR and DWS, Northern Cape through the integrated application process
National Environmental Management Air Quality Act (Act No. 39 of 2004)	Air quality management Section 32 – Dust control. Section 34 – Noise control. Section 35 – Control of offensive odours. The principles of the NEM: AQA, focusing on minimisation of pollutant emissions will also be taken cognisance of in the development of the EMPr.	Department of Environmental Affairs and Sol Plaatje Local Municipality

Legislation	Description and Relevance	Authority
The National Forestry Act, 1998 (Act No. 84 of 1998) (NFA)	The NFA protects against the cutting, disturbance, damage, destruction or removal of protected trees. A biodiversity specialist study will be undertaken for the application. The study will include an assessment of the significance of biodiversity impacts and mitigation measures will be included in the EMPr. Should there be any protected trees that are affected by the project, Golden Tropic will apply for the required permit for the removal and/or relocation of the trees.	Department of Agriculture, Forestry and Fisheries (DAFF)
The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of NEMA, as well as the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources. The Act provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected During the EIA process, biodiversity hotspots and bioregions will be investigated to determine the potential impacts that the project may have on the receiving environment. The management and control of alien invasive species on the impacted areas during all the phases of the project will be governed by the NEM: BA. The NEM: BA ensures that provision is made by the site developer to remove any alien species, which have been introduced to the site or are present on the site	Department of Environmental Affairs
Northern Cape Nature Conversation Act No. 9 of 2009	This Act provides sustainable utilization of wild animals, aquatic biota and plants to provide for them implementation of the convention on international trade in endangered species of wild fauna and flora. The Act provides for offenses and penalties of contravention Act, further provide for the appointment nature conservator to implement the provision of the Act. It also provides the issuing of the permits and other authorisations and provides matters connected therewith. Should there be any protected trees that are affected by the project, Golden Tropic will apply for the required permit for the removal and/or relocation of the trees.	Northern Cape Department of Nature Conservation (DENC)
Mine Health Safety Act, 1996 (Act No. 29 of 1996) (MHSA)	The Mine Health and Safety Act (Act No. 29 of 1996) (MHSA) aims to provide for protection of the health and safety of all employees and other personnel at the mines of South Africa. Golden Tropic will need to ensure that employees, contractors, sub-contractors and visiting personnel, adhere to this Act and subsequent amendment regulations on site.	Department of Mineral Resources (Northern Cape)
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	Control measures for erosion Control measures for alien and invasive plant species The EMPr will include measures to control and manage alien invasive plant species.	Department of Agriculture Forestry and Fisheries

Legislation	Description and Relevance	Authority
National Heritage Resources Act 25 of 1999	Heritage Permit for structures 60 years or older. A heritage specialist study will be conducted for the project. The study will include an assessment of the significance of heritage impacts and mitigation measures will be included in the EMPr. Should there be any heritage and cultural resources that are affected by the project, Golden Tropic will apply for the required permit for the destruction and/or relocation of the trees.	Northern Cape Heritage Resource Authority
Restitution of Land Rights Act, 1994 (Act No. 22 of 1994), as amended in 2014.	Land Claims. There are no land claims associated with the affected property.	Department of Rural Development and Land Reform

6.1 Municipal Plans and Policies: Kai !Garib Integrated Development Plan

According to the Integrated Development Plan (IDP) for the Kai !Garib Local Municipality (2020/2021), mining and agriculture are the two primary economic sectors in the LM. The mining sector reached its highest point of growth of 7.6% in 2017. The Northern Cape Provincial Growth and Development Plan (PGDP) vision 2040 considers mining and mineral beneficiation to be part of driver 1 (Economic Growth and prosperity).

It is expected that the mining project will contribute significantly to the local, regional and national economy. The extent to which the project will contribute to the economy will be assessed during the impact assessment phase of the process.

6.2 Other guidelines

Other guidelines that were made use of include:

- Northern Cape Provincial Biodiversity Conservation Plan;
- DWS, 2010. Operational Guideline: Integrated Water and Waste Management Plan. Resource Protection and Waste;
- Department: Water Affairs and Forestry, 2007. Best Practice Guideline A2: Water Management for Mine Residue Deposits;
- Department: Water Affairs and Forestry, 2007. Best Practice Guideline A4: Pollution control dams;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline A6: Water Management for Underground Mines.
- White paper on Integrated Pollution and Waste Management in South Africa, 2000;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G1 Storm Water Management;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G2: Water and Salt Balances;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline G3. Water Monitoring Systems;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline G4: Impact Prediction;
- Department of Water Affairs and Forestry, 2008. Best Practice Guideline H1: Integrated Mine Water Management;
- Department of Water Affairs and Forestry, 2006. Best Practice Guideline H3: Water Reuse and Reclamation;
- DEAT. 2002. Integrated Environmental Management, Information series 2: Scoping. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 3: Stakeholder Engagement. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 4: Specialist Studies. Department of Environmental Affairs and Tourism (DEAT. 2002);
- DEAT. 2002. Integrated Environmental Management, Information series 12: Environmental Management Programmes. Department of Environmental Affairs and Tourism (DEAT. 2002);

- DEA. 2012. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs; and
- DEA. 2017. Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa.

7 Motivation

7.1 Mining Benefits

The mining industry is of great importance to the South African economy. According to the DMR, in 2004, the total export earnings from granite was approximately R 342 million, with Italy being the greatest single importer of South African granite.

Opportunities that exist within mining are as follows:

- Constant demand on the market for commodities;
- Establishment of a permanent working group between the municipality and the mine managers responsible from developing local economic development initiatives;
- Encourage local SMME's and entrepreneurs to take advantage of procurement;
- Develop a database of available labour and skills to encourage the employment of local people;
- Provide skills training and support programmes; and
- Instigate mining procurement opportunities in consultation with the mines, develop a database of such opportunities and ensure that this information is made available to local businesses and communities.

International markets for the granite products have already been identified, where the cut granite will be exported from the Cape Town harbour where they will be further cut. Locally the product is being sold at the mine.

7.2 Environmental responsibility

It is expected that the mining project will have negative environmental impacts, including, but not limited to the impacts that have been included in Section 13 of this report.

The impacts will be investigated in detail during the impact assessment phase of the project. Where possible, measures to mitigate the impacts of the project will be identified and finalised during the impact assessment phase of the project. The mitigation measures will include designs and management practices that will be embarked on, to prevent and/or minimise the identified impacts on the social, cultural and environmental aspects. For each potential significant impact identified, mitigation measures will be specified. High level mitigation measures have been included in Section 13 of this report. These mitigation measures will be described in more detail in the EMPr that Golden Tropic will be required to comply with throughout the Life of Mine (LOM).

The EMPr will also include environmental monitoring programme that will allow Golden Tropic to keep track of the impacts of the project on the environment and where required, to take remedial action.

7.3 Socio-economic benefits

A Social and Labour Plan (SLP) has been developed for the proposed Golden Tropic Granite Mining project. The SLP includes community development which will be implemented by Golden Tropic as part of the social responsibility programme. Through the Human Resources Development Program, the Golden Tropic will ensure that communities and HDSA companies are offered an opportunity to develop educationally and economically.

Golden Tropic proposes to undertake the following:

- Employment: Golden Tropic intends to employ about 80 employees in total.
- Skills Development and Training: A full and detailed Skills Development Plan (SDP) containing annual future targets, numbers and programmes, will be compiled and submitted to the DMR

within six (6) months of receiving the Mining Right. The compilation of this plan is dependent on the completion of individual assessments with each employee in order to determine their current and aspired levels of education and skills training, as well as their socio-economic backgrounds. To ensure that the objectives of the SDP are achieved, Golden Tropic will submit a workforce skills plan and an annual training report as per the MQA SETA requirements for the mine Project each year after granting of the mining right.

- Illiteracy level and Adult Basic Education and Training (ABET) needs: Golden Tropic will formulate and implement a Skills Development Plan (SDP) which will focus on the transfer of skills to employees, to further their capacity in the mining industry, and equip them with alternative skills for after mine closure. The illiteracy levels and ABET needs will be determined once the SDP has been developed and populated.
- Planned ABET training: ABET will be offered to employees and the community as part of the Golden Tropic Human Resource development. ABET for the community prioritised by Golden Tropic will ensure that the employees and communities are offered the opportunity to become functionally literate and numerate. It is anticipated that ABET training will amount to R 15 000 in year 2, R17 500.00 in year 3, R 20 000.00 in year 4 and R 22 500.00 in year 5.
- Core business training: Core business training will be offered to the front-end loader and Safety and Environment personnel. The total cost of core business training over the 5-year period will be R 95 500.00.
- Mentorship: It is the strategic intent of the Mine management to achieve full performance of all employees throughout the organization and a mentorship programme is regarded as a key instrument. The proposed mentorship model is to have external mentors for the senior management team, and then at the lower management and operational levels to partner staff members (the mentees) with higher skilled and experienced staff members (the mentors).
- Bursaries: The company will sponsor one person per year to attend modules towards mining or engineering. Preference will be given to a woman in order to help address the need for 10% of the women in mining more specifically in core mining positions. Some technical knowhow is required for acceptance to this institution. Should for some reason none of the employees get accepted in any given year, the company would open the opportunity to a qualifying member of the community and surrounding areas. The bursaries to be awarded will amount to R 135 000.00 over a 5-year period.
- Internship plan: Two (2) potential internship paths to be followed at the mine will include opportunity to expose senior / upper level (or even supervisory level management) to an internship. Assume one candidate from school or from TVET college undergoing mining related course (during holidays or end of year break) to spend about a month on site under the wings of senior mine management. Another which could realistically be offered is a short-term internship, offered solely to HDSA women, to be interns as operators. The intern will be employed on a short-term contract period by the applicant and will be paid a nominal salary by the applicant. Women interns from the labour sending area will be "employed" for a limited contract specifically as operators in this instance. An estimated budget of R 90 000.00 has been allocated to internships.

It is expected that the proposed mine will develop and implement a policy allowing for preferential procurement for the local businesses and training of local Small, Medium and Micro-sized Enterprises (SMME) on procurement and business management.

The proposed mine is expected to have a positive socio-economic benefit through employment of locals. Recruitment of labour will be guided by Golden Tropic's recruitment policies which are expected to promote the employment of local labour by the mine as well as by any appointed contractors. A local employment procedure and recruitment process will be developed in consultation with local authorities and their representatives. Golden Tropic will ensure that a transparent process of employment will be followed to limit opportunities for conflict that may arise.

Golden Tropic will use recruitment to meet the targets as set forth in the SLP. Positions will be reserved and earmarked for both HDSA's and women in mining to ensure that the targets of women in mining and HDSA in all management levels are met. Although specialist and skilled labour may be recruited outside the local boundaries due to the skills scarcity, local residents will benefit through on the job training, where possible.

7.4 No-go option

The no-go alternative would entail not mining the granite and leaving the landuse in the area as agriculture and mining. Should the proposed mining development not take place, it entails that the land will continuously be used for agriculture and mining, depending on the landowners needs and desirability for the future. Agriculture is undoubtedly one of the most important sectors in South Africa, with agriculture contributing to Kai !Garib's, as is noted in the LM's IDP, Northern Cape Province and South Africa's Gross Domestic Product (GDP), but not nearly as much as the mining sector.

By not implementing this project the local economic and employment opportunities and revenue as well as the mined granite which could potentially have benefitted the economy would be lost.

The socio-economic impacts of no implementing the project include local, regional and more than likely national impacts:

- Local and regional: planned socio-economic initiatives within the surrounding communities (refer Section 7.3 above) would not be able to go ahead; and
- National: Loss opportunities in foreign exchange for South Africa will be incurred as the potential to sell the granite internationally will be lost.

Although not fully assessed at this time, the additional potential negative impacts on the environment associated with granite mining would not exist should the project not be implemented. The environmental, social and economic impacts will be assessed in detail during the impact assessment phase to identify and address all negative impacts, where possible.

8 Motivation for the Preferred Development Footprint

The identification and investigation of alternatives is a key aspect during the S&EIA process. All reasonable and feasible alternatives must be identified and assessed during the scoping phase to determine the most suitable alternatives to consider and assess during the impact assessment phase. There are however some significant constraints that have to be taken into account when identifying alternatives for a project of this scope. Such constraints include social, financial and environmental issues, which will be discussed in the evaluation of the alternatives. The preferred option is to be highlighted and presented to the authorities.

Alternatives can typically be identified according to:

- Location alternatives;
- Process alternatives;
- Technological alternatives; and
- Activity alternatives (including the No-go option).

For any alternative to be considered feasible, such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts. The alternatives are described, and the advantages and disadvantages are presented. It is further indicated which alternatives are considered feasible from a technical as well as environmental perspective.

Incremental alternatives typically arise during the impact assessment process and are usually included as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation measures and are not specifically identified as distinct alternatives. This section provides information on the development footprint alternatives, the properties considered, as well as the type of activity, activity layout, technological and operational aspects of the activity.

8.1 The property on which or location where it is proposed to undertake the activity

The location of the proposed project components is constrained to the location of the existing and confirmed mineral resource (granite). Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology (Figure 8-1).

The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. As such, the site is therefore regarded as the preferred site and alternatives are not considered.

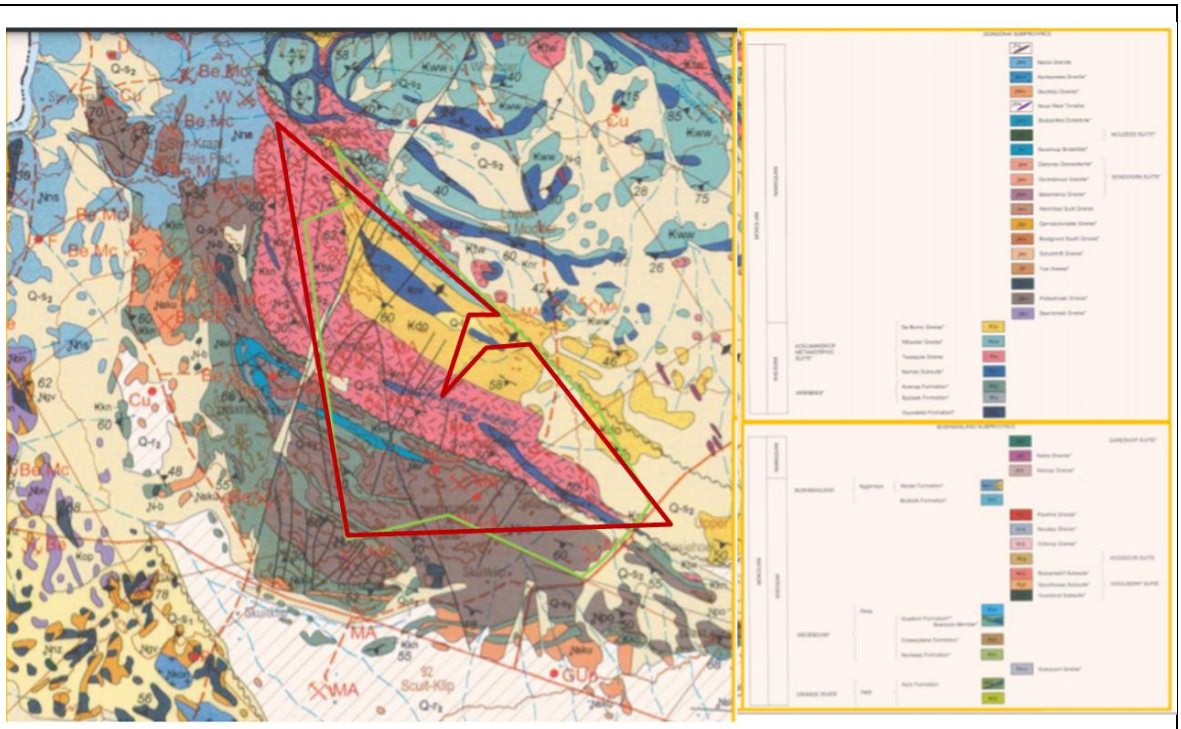


Figure 8-1: Geology of the proposed mining area

8.2 Type of Activity

An alternative to the type of activity would be agriculture and mining. It is however expected that due to low rainfall and high temperatures associated with the project area, the agriculture potential will be low.

A socio-economic impact assessment has been included in the impact assessment section of this report (Section 13).

8.3 Design or Layout of the Activity

The design or layout of a mining project is determined by the shape, position and orientation of the mineral resource. It is expected that mining and rehabilitation will be undertaken sequentially to keep disturbed areas to a minimum.

The significance of the impacts will be investigated in depth during the impact assessment phase of the project.

8.4 The Technology to be used in the Activity

The technology used in a mining project will depend on the shape, position and orientation of the granite. This mining operation can be classified as quarrying the open or surface excavation of granite. Quarrying will be started at the surface and will maintain exposure to the surface throughout the extraction period. The excavation will have stepped or benched side slopes to ensure safety. Quarrying methods depend mainly on the desired size and shape of the stone and its physical characteristics and the main equipment used are diamond saws (rotary saws).

- Diamond saws are large diamond-impregnated circular blades up to 2 m in diameter that are used to form vertical cuts in the rock by moving the machine along a guideline or rail. Extremely accurate cuts can be made in this way.

- Wire saws consist of several pulleys over which pass an endless carborundum or diamond-impregnated steel wire.

The mining method will entail:

- The establishment of a flat floor through the use of diamond wire saws.
- The flat floor will be fitted with parallel rails which serve the rotary saws used to cut blocks from the ore body.
- The base of the blocks will be separated by small diameter plug and feather technique.
- The raw cut block will then be lifted out of the hole and placed for transport by block carrying front end loader to the dressing area where protuberances will be removed from the block.
- The 1st grade blocks will be transported to the dispatch yard and the 2nd grade blocks to a separate stockpile area.
- Waste blocks and offcuts will be transported front end loader to the waste rock dump area.

8.5 The Operation Aspects of the Activity

The operational plan for the mine is based on demand per granite colour. Access roads to be used will need to be negotiated with the landowners affected by the MRA.

8.6 The Option of Not Implementing the activity

The no-go alternative would entail not mining the granite and leaving the landuse in the area as agriculture and mining. Should the proposed mining development not take place, it entails that the land will continuously be used for agriculture and mining, depending on the landowners needs and desirability for the future. Agriculture is undoubtedly one of the most important sectors in South Africa, with agriculture contributing to Kai !Garib's, as is noted in the LM's IDP, Northern Cape Province and South Africa's Gross Domestic Product (GDP), but not nearly as much as the mining sector.

By not implementing this project the local economic and employment opportunities and revenue as well as the mined granite which could potentially have benefitted the economy would be lost.

The socio-economic impacts of no implementing the project include local, regional and more than likely national impacts:

- Local and regional: planned socio-economic initiatives within the surrounding communities (refer Section 7.3 above) would not be able to go ahead; and
- National: Loss opportunities in foreign exchange for South Africa will be incurred as the potential to sell the granite internationally will be lost.

Although not fully assessed at this time, the additional potential negative impacts on the environment associated with granite mining would not exist should the project not be implemented. The environmental, social and economic impacts will be assessed in detail during the impact assessment phase to identify and address all negative impacts, where possible.

9 Public Participation process

The objectives of stakeholder engagement for the different phases of the application are as follows;

- During scoping: The objectives of the stakeholder engagement during scoping phase is to provide sufficient and accessible information to stakeholders in an objective manner to enable them to raise issues of concern and suggestions for enhanced benefits and to verify that their issues have been recorded. The stakeholders can also provide input into the Terms of Reference (ToR) for specialist studies, impact assessment and management planning and contribute relevant local and traditional knowledge to the environmental assessment;
- During impact assessment: The objectives of the stakeholder engagement during the impact assessment phase are to verify that their issues have been considered in the EIA and to further comment on the findings of the environmental assessment; and
- During the decision-making phase: Following the outcome of the decision-making process by authorities, stakeholders will be informed of the outcome and how and by when the decision can be appealed.

The stakeholder engagement process will be conducted in terms of NEMA, which provides clear guidelines for stakeholder engagement during an EIA as summarised in Table 9-1.

Table 9-1: NEMA Stakeholder Guidelines

NEMA Section	Applicability to Stakeholder Engagement
Chapter 1	Outlines the principles of environmental management, several pertaining to public consultation (e.g. Chapter 1, subsections (2), (3), (4) (f), (g), (h), (k), (q) and (r).
Chapter 6,	Regulations 39 – 44 of the amended EIA Regulations GNR) 326, promulgated on 8 December 2014, specify the minimum requirements for stakeholder engagement in an EIA process conducted under the NEMA.
Section 24J of the NEMA	In 2017, the Minister of Environmental Affairs published, Section 24J of the NEMA in terms of**,** Public Participation Guidelines which guide the Public Participation Process in order to give effect to Section (2)(4)(f), (o) and 24 (1A)(C) of the NEMA.

Figure 9-1 provides a diagram of an Integrated Stakeholder Engagement Process for the proposed project.

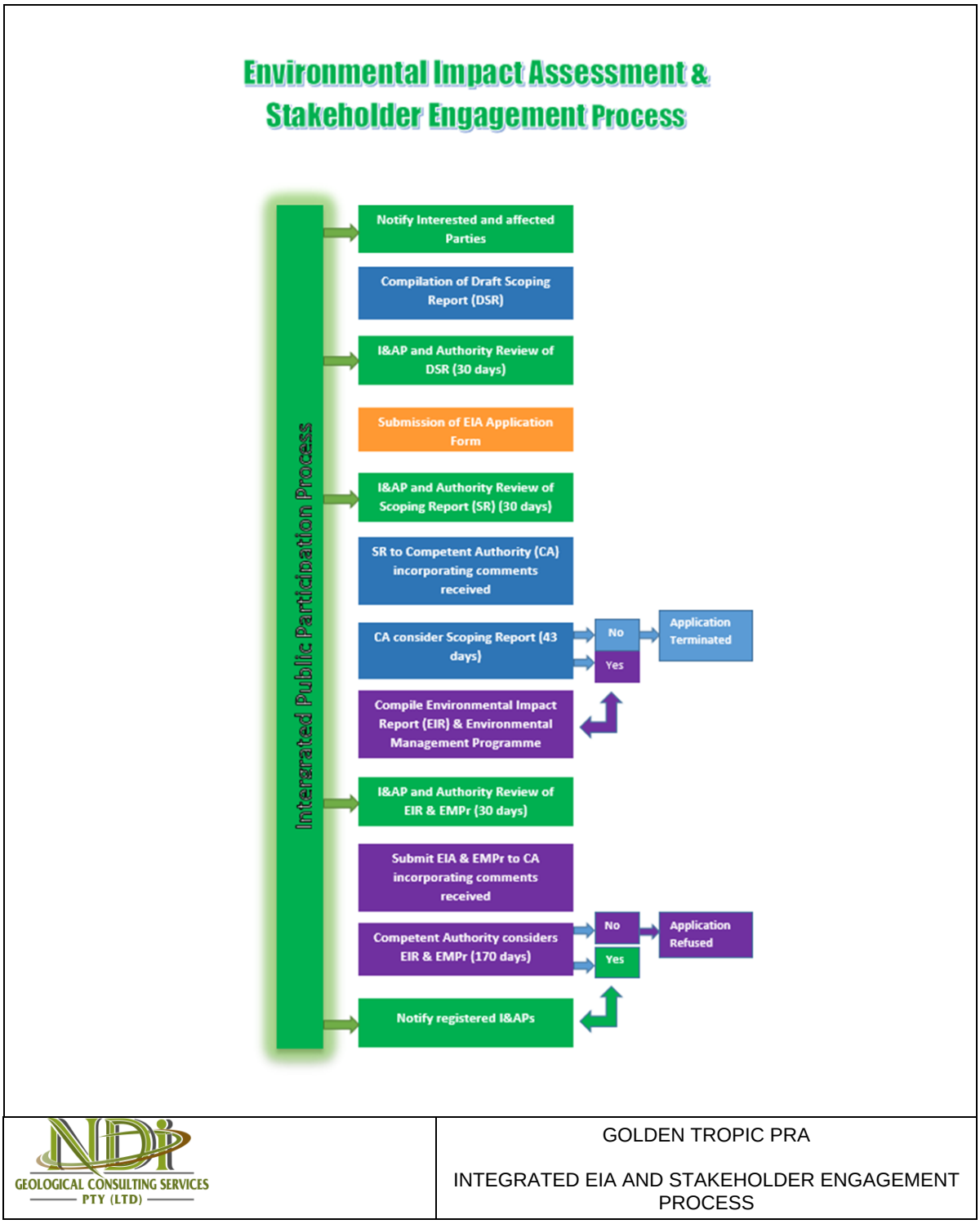


Figure 9-1: Integrated EIA and Stakeholder Engagement Process

All the above-mentioned guidelines have been incorporated into this stakeholder engagement process. The application was submitted to the DMR for authorisation as the competent authority. Identified commenting authorities on this application include:

- DWS – Regional Office;
- SAHRA – Provincial;
- Kai !Garib Local Municipality;
- ZF Mgcawu District Municipality; and

- Northern Cape Department of Nature Conservation (DENC).

9.1 Scoping Phase

9.1.1 Stakeholder Identification Interested and Affected Parties

Interested and Affected Parties (I&APs) were identified using GIS and cadastral information to identify affected and adjacent properties. The affected and adjacent property owners were identified using the surveyor general website, www.deedsweb.gov.za. In addition, registered I&APs were also sourced from responses to the advertisements, site notices and written notification to I&APs associated with the project.

The I&APs register will be maintained for the duration of the study where the details of stakeholders are captured and automatically updated upon communication to the EAP. The identification, registration, and comments from I&APs will be an on-going activity.

The identified affected and adjacent properties are provided in Table 9-2 and Table 9-3.

Table 9-2: List of Affected Farm and Farm Portions

Farm	Portions	21 Digit Survey General Code
Zwart Modder Mountain No. 446 (445)	A portion of the farm	C03600000000044600000

Table 9-3: List of Adjacent Farm and Farm Portions

Farm	Portions	21 Digit Survey General Code
Scuit-Klip 92	Portion 1	C03600000000009200001
Zwart Modder Mountain No. 446 (445)	Remaining portion of the farm	C03600000000044600000
Scuit-Klip 92	Remainder	C03600000000009200000
Scuit-Klip 92	Portion 2	C03600000000009200002
Upper Zwart 78	Remainder	C03600000000007800000
Upper Zwart 78	Portion 2	C03600000000007800002
Lower Zwart Modder 79	Portion 1	C03600000000007900001
Lower Zwart Modder 79	Remainder	C03600000000007900000
OUP 80	Remainder	C03600000000008000000

A map of the affected and adjacent farm portions and farm portions of the site is provided in Figure 9-2.

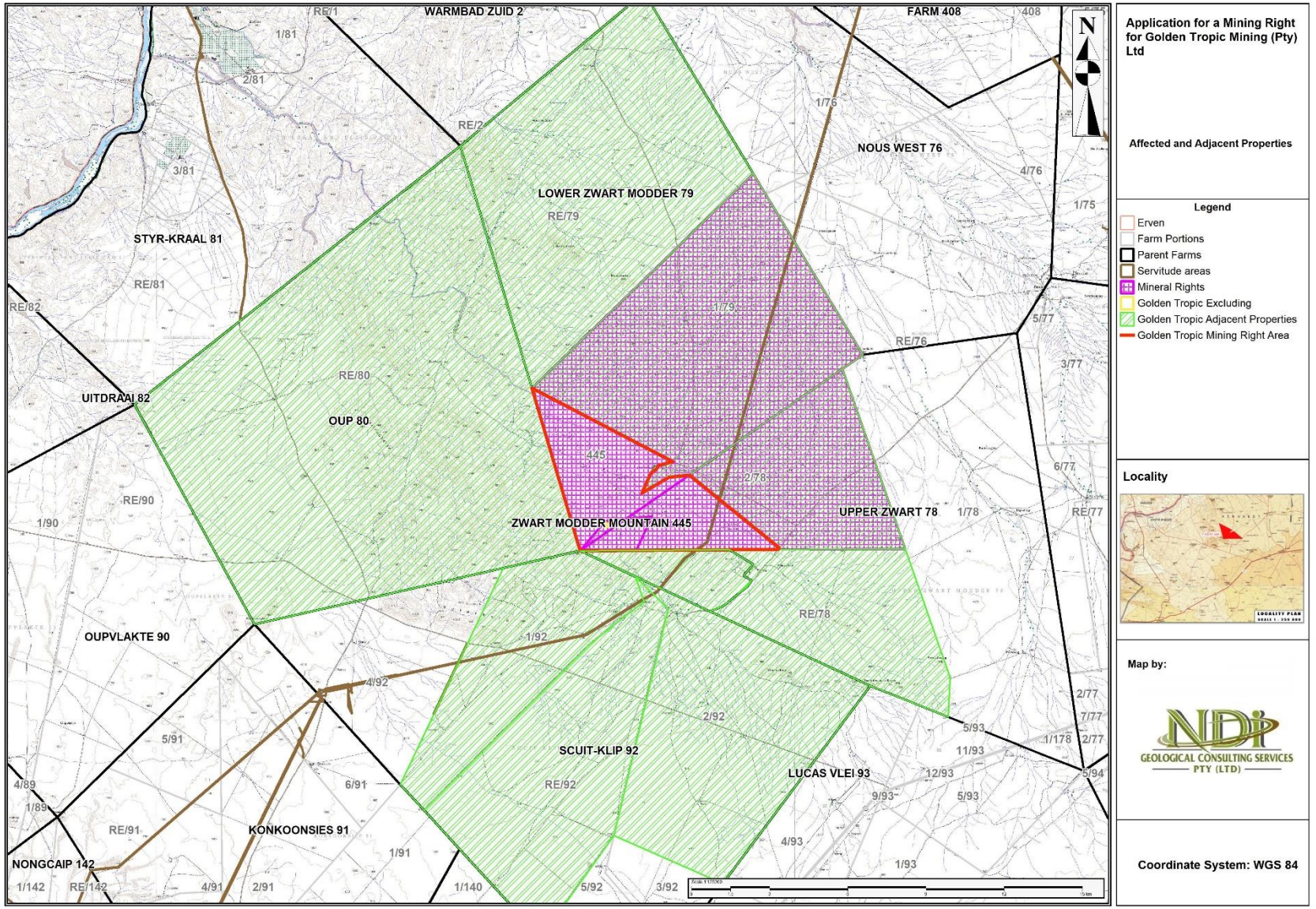


Figure 9-2: Affected and Adjacent Properties

9.1.2 Notification and Registration of the I&APs

Ndi Geological Consulting Services (Pty) Ltd made use of various methods to inform stakeholder of Golden Tropic's intention to undertake the required EA/WML process. Stakeholders were provided with the opportunity to participate and register as I&APs during the announcement phase of the project.

Distribution of Notification Letters

Notification letters were sent to identified I&APs, informing them of the proposed project.

Site Notice Placements

Sites notice boards (Size A2: 600 mm X 420 mm) notifying stakeholders and I&APs of the proposed activity were placed at conspicuous places in the project area as summarised in Table 9-4.

Table 9-4: On-Site Notice Location and Coordinates

Site Notice Location	Coordinates	
	Longitude	**Latitude**
1	28.746237ºS	19.275116ºE
2	28.789026ºS	19.325122ºE
3	28.881159ºS	19.691653ºE
4	28.911771ºS	19.786876ºE
5	28.767348ºS	20.613388ºE
6	28.749935ºS	20.632287ºE

Newspaper Advertisements

Newspaper advertisements notifying stakeholders about the proposed project and the opportunity to participate in the EIA process were placed in the newspapers.

9.1.3 Notification of the Availability of the Draft Scoping Report

The availability of the DSR was announced by means of SMS, letters and emails to registered I&APs. The DSR, announcement letters and comment forms were made available for public viewing and comment in the same public places as for the project announcement phase.

9.1.4 Stakeholder commenting period

The Scoping Report was made available for a 30-day commenting period from 14 June 2021 to 16 July 2021. The Scoping Report was also made available to the competent and commenting authorities during the 30-day stakeholder review and commenting period. Stakeholders were encouraged to submit their written comments to the EIA team through the contact details provided. Stakeholders could also fill in comment forms at one of the public places and/or contact the EAP via telephone, email or fax to submit comments and to discuss any issues of concern.

All comments received thus far have been incorporated recorded and included in the Final Scoping Report.

9.1.5 Key Stakeholder Discussions

One on one key stakeholder discussions were held with the adjacent landowners during the scoping phase of the project where the stakeholders were provided with a brief description of the proposed project and were provided with an opportunity to comment and raise issues that may need to be

included in the impact assessment phase. All comments received have been incorporated into the final Scoping Report.

9.2 Impact Assessment Phase

The Public Participation Process will be ongoing throughout all the project phases. The stakeholder engagement proposed for the Impact Assessment Phase is presented below.

9.2.1 Newspaper Advertisement

A newspaper advertisement informing registered I&APs of the public comment period for the Draft EIA and details of the public meeting was published in the Gemsbok on 10 November 2021.

9.2.2 Notification Letter

A notification letter informing registered I&APs of the public comment period for the Draft EIA and details of the public meeting was distributed to I&APs via email and SMS.

9.2.3 Draft Report Commenting Period

The Draft EIA/EMPr will be made available to I&APs for a 30-day comment period between 15 November 2021 and 15 December 2021 on the Ndi Geological's website (http://www.ndigeoservices.co.za/). Hard copies will also be made available for perusal at the venues used for the Draft Scoping Report.

9.2.4 Public Meeting

A public meeting will be held with I&APs at Pofadder Hotel on 20 November 2021 as contained in the advertisement that was published in the Gemsbok on 10 November 2021.

9.2.5 Notification of authority decision

Registered stakeholders will be advised in writing (mail, email, fax and SMS) of the authority decision on the EIA / EMPr, and details on the procedure to appeal the decision. Notification to registered stakeholders will summarise the authorities' decision and provide information according to legal requirements on how to lodge an appeal should they so wish.

9.2.6 Summary of Issues Raised by I&APs

The comments received to date have been comments that have been included in Table 9-5..

Table 9-5: Summary of the Issues Raised by the I&APs

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Consultation Status (consensus dispute, not finalised, etc)**
AFFECTED PARTIES					
Landowner/s	X				
Lawful occupier/s of the land	X				
Landowners or lawful occupiers on adjacent properties	X				
Willie Claassens	X	15 June 2021	The mine must employ local people	It is expected that the mine will favour employment of local people. The EMPr will include the employment of local people as far as possible as a mitigation measure that the mine will be required to comply with. As stated in Section 7.3, it is expected that the proposed mine will develop and implement a policy allowing for preferential procurement for the local businesses and training of local Small, Medium and Micro-sized Enterprises (SMME) on procurement and business management.	Consensus
Willie Claassens	X	15 June 2021	The mine must maintain the road by using a grader not the tyres that use to maintain the road	The EMPr will include a mitigation measure that requires Golden Trophic to maintain roads they make use and ensure that undue degradation occurs due to their mining activities.	Consensus
Willie Claassens	X	15 June 2021	The mine must make sure there is no illegal hunting taking place on adjacent farms	Noted, the EMPr will include a mitigation measure stating that no illegal hunting will be allowed in the	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
				area as way of managing impacts on the fauna in the area.	
Willie Claassens	X	9 July 2021	Water: It is absolutely inconceivable that the extremely scarce water found in the stone desert is used to help function saws with which the granite blocks are sawn out. We are an area where years of droughts occur and boreholes that dry up are regularly recorded. The groundwater is not complementary or sustainable. This groundwater must therefore be used very sparingly by humans and animals, therefore my opinion is that the use of the groundwater for my purposes should be stopped immediately. My suggestion to the mining institution is that water be obtained from the Orange River, after an application has been submitted to the right state department.	An application for the abstraction of borehole water will be submitted to the DWS. The applicant will be required to provide proof that there are sufficient groundwater resources in the area to provide for the proposed mining activities. In addition to groundwater, the mine will make use of recycled process water for both domestic and process requirements, which will greatly reduce the demand for groundwater. The groundwater assessment conducted for the project found that the demand for the Zwart Modder Mountain mine is 45.1 m^3/d, way below the groundwater recharge volume of 479 m^3/d or 0.55 l/s for 12h/d in the area. The proposed mine will therefore not have an impact on water availability for the surrounding users.	Consensus
Willie Claassens	X	9 July 2021	Roads: Currently, the roads (Road No. 77) and the Nous / Augrabies road are used by dozens of heavy vehicles / trucks driving away granite blocks. To date, the mining company has made little contribution to the maintenance of the roads, and until recently made no agreement or contact with Khai Gariep District Council regarding the condition of the roads.	It must be noted that the current application is for a new mining right, and not for an existing mine. The current mine must have its own EMPr that includes mitigation measures that are supposed to be implemented to minimise the impact on the roads. The I&APs are encouraged to approach the current mine and discuss the concerns	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			The Nous / Augrabies road is being scraped at their expense by vineyard farmers, while the granite truck is the largest road consumer all year round. See it as ridiculous that the mining company occasionally drags tires to try to make road no 77 drivable.	with regard to current road maintenance activities.	
Willie Claassens	X	9 July 2021	Fauna & Flora: Where granite is currently mined has all these years been the habitat of various animals, e.g., stone goats, turtles, other small goat species, as well as the extremely endangered and protective cheetah. Where did they have to move to?? On the neighboring farm Oup No 80, 2 Gemsboks and a kudu were recently found breaking loose from traps and dragging them along. Investigation is instituted. However, care must be taken that no turtle, snake or any plant is disturbed.	Noted, a biodiversity management plan will be compiled as part of the impact assessment phase. The biodiversity management plan will include mitigation measures that applicant will be required to implement to minimise the impact on biodiversity (flora and fauna).	Consensus
Willie Claassens	X	9 July 2021	Waste / Waste: The waste program leaves much to be desired. The loose stones & defective granite blocks look very unsightly. "Waste" is not covered with soil, as a result a plant will not grow again, or any animal will be able to walk there. Please stop it immediately.	A waste management plan will be compiled as part of the impact assessment phase of the process which the applicant will be required to implement.	Consensus
Willie Claassens	X	9 July 2021	Community benefit: To the best of my knowledge, the community is not benefited by the mine anywhere, while we should be satisfied that large heavy vehicles cover the area & animal feed (grass along the road)	The EAP had a brief project background discussion with the immediate adjacent landowners who were available at the time to discuss the proposed project. The applicant compiled a Social Labour Plan that	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			with a layer of dust on a road that is towed level with tire. It is proposed that an urgent meeting be convened between the license applicant (My company) and landowners in the immediate area, as well as the local Agricultural Associations, as well as government departments in the case of water affairs. I consider it very important before any license is granted, urgent attention and solutions will be found, before the license is granted.	details how the community will benefit from the proposed project. All the identified social and health impacts that may result from the project will be assessed during the impact assessment phase of the process and mitigation measures will be identified that will be implemented to minimise and/or avoid negative impacts and enhance positive impacts of the proposed project. Should it be required, with the COVID-19 regulations permitting, a public meeting will be held with the stakeholders during the impact assessment phase of the project. The applicant has submitted an application for a Water Use Licence to the DWS. An Integrated Water and Waste Management Plan will be compiled that will be submitted to the DWS for review and comment.	
C.H.A Kennedy	X	15 June 2021	We must try to help the applicant to follow up with the previous company that mine on her farm to see if its still interested in mining the area. If not, we must try to get a company that is interested to work that area.	Noted. The current application does not include the farm owned by the stakeholder.	Consensus
C.H.A Kennedy	X	15 June 2021	The previous company must remove their waste from where they dumped it because it destabilised the water flow of the area.	Noted, the I&APs were encouraged to approach the DMR to ensure that the previous mining company is held to account and ensure that their waste is removed from the area, should it be necessary.	Consensus

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Consultation Status (consensus dispute, not finalised, etc)**
C.H.A Kennedy	X	15 June 2021	If we have any feedback for her, we must forward it to her lawyer because of the network problems they experience in the area.	Noted.	Consensus
Municipal councillor	X				
Municipality	X				
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWA	X				
DWS		15 July 2021	The Department of Water and Sanitation hereby acknowledges receipt of your pre-application consultation request for a Water Use Licence that was received on 14 Jul 2021. Please continue to apply for a Water Use Licence.	Noted, the EAP will continue with the application for a WUL.	Consensus
SAHRA			The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit notes the pending assessment of the impact to heritage resources and requests that the assessment comply with Section 38(3) of the National Heritage Resources Act, Act 25 of 1999 (NHRA). Additionally, the assessment of the impact to archaeological resources must be conducted by a qualified archaeologist and comply with the 2007 SAHRA Minimum Standards:	Noted. A suitably qualified specialist was be appointed to undertake the Heritage Resources and Palaeontology Assessment per the requirements of the NHRA and Appendix 6 of the NEMA. The draft EIA/EMPr Report and the Heritage Resources and Palaeontology Reports will be made available to the SAHRA via SAHRIS for review and comment.	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			Archaeological and Palaeontological Components of Impact Assessments. As the mining rights application area is located in an area of moderate sensitivity for palaeontological resources as per the SAHRIS Palaeosensitivity map, a desktop Palaeontological Impact Assessment (PIA) must be required to be undertaken by a qualified palaeontologist. (See https://www.palaeosa.org/heritage-practitioners.html for a list of qualified palaeontologists). The report must comply with the 2012 Minimum Standards: Palaeontological Components of Heritage Impact Assessments. Further comments will be issued upon receipt of the above requested reports and the draft EIA documents inclusive of appendices.		
Communities	X				
Dept. Land Affairs	X				
Office of the Regional Land Claims Commissioner: Northern Cape		16 July 2021	We confirm that as at the date of this letter that no land claim appears on our database in respect of the Properties this includes the database for claims lodged by 31 December 1998; and those lodged between 1 July 2014 and 27 July 2016 in terms of the Restitution of Land Rights Amendment Act, 2014.	Noted. The EAP is not aware of any change in the description of the above property after 19 June 1913.	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			Whilst the Commission takes reasonable care to ensure the accuracy of the information it provides, there are various factors that are beyond the Commission's control, particularly relating to claims that have lodged but not yet been gazetted such as: • Some Claimants referred to properties they claim dispossession of rights in land against using historical property descriptions which may not match the current property description; and • Some Claimants provided the geographic descriptions of the land they claim without mentioning the particular actual property description they claim dispossession of rights in land against. The Commission therefore does not accept any liability whatsoever if through the process of further investigation of claims it is found that there is in fact a land claim in respect of the above property. If you are aware of any change in the description of the above property after 19 June 1913 kindly supply us with such description so as to enable us to do a further search.		
Traditional Leaders	X				

Interested and Affected Parties **List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.**		**Date Comments Received**	**Issues raised**	**EAPs response to issues as mandated by the applicant**	**Consultation Status (consensus dispute, not finalised, etc)**
Dept. Environmental Affairs	X				
Other Competent Authorities affected	X				
OTHER AFFECTED PARTIES	X				
Mr Gerhard Visser		27 July 2021	All the impacts (underground water, dust, noise, vibration, waste, security, road maintenance etc.) the proposed mining will have on the environment and on surrounding community need to be identified.	All potential impact will be identified and assessed during the impact assessment phase. The draft EIA/EMPr report, containing the monitoring programme for different aspects of the environment will be made available for review and comment by the registered I&APs.	Consensus
Mr Gerhard Visser		27 July 2021	Baseline values for all of these impacts need to be established before mining start	As part of the EIA process, the EAP is required to include a baseline characterisation of the different aspects of the environment, based on which an impact assessment will then be conducted. The EIA/EMPr report which will made available for revie and comment by registered I&APs will include a section on the baseline characterisation of the area.	Consensus
Mr Gerhard Visser		27 July 2021	A Proper impact monitoring program need to be established / negotiated.	The EIA/EMPr Report will include a monitoring programme for the different aspects of the environment. The report will be made available for review and comment by registered I&APs. Comments received will be incorporated into the final EIA/EMPr	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			report that will be submitted to the DMR for decision making.	
Mr Gerhard Visser	27 July 2021	Remedial actions need to be negotiated.	The EIA/EMPr Report will include a mitigation and/or remedial actions required for the different aspects of the environment. The report will be made available for review and comment by registered I&APs. Comments received will be incorporated into the final EIA/EMPr report that will be submitted to the DMR for decision making.	Consensus
Mr Gerhard Visser	27 July 2021	All of the above need to be negotiate with the neighbouring farmers/community and result in an Impact Management Agreement that will for part of the EMPr.	Please be advised that the National Environmental Management Act, 1998 (Act 107 of 1998) NEMA does not make provision for Impact Management Agreements that form part of EMPrs. However, the draft EMPr will be submitted to all the registered I&APs for review and comments. The comments received will be incorporated into the final EMPr that will be submitted to the DMR for decision making. Copies of all comments received, and responses provided will also be submitted to the DMR, who will determine if the EAP has incorporated and/or responded to the I&AP comments sufficiently.	Consensus
Mr Gerhard Visser	27 July 2021	I urgently request a meeting with all of the I&APs and neighbouring farmers in order to establish a proper IMA between the relevant parties.	Please be advised that the process is just starting, with only the scoping phase having been undertaken to date. The EAP team and specialists are yet to undertake the impact assessment,	Consensus

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted.	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Consultation Status (consensus dispute, not finalised, etc)
			where the impacts will be identified and assessed, and the impact management actions identified and documented in the EIA/EMPr Report. A copy of the draft report will be made available to all the registered I&APs, including yourself, for review and comment. All the comments received from I&APs will be incorporated into the final EIA/EMPr Report that will be submitted to the DMR for decision making. Should, after review of the draft EIA/EMPr Report, the I&APs require additional information or a meeting with the EAP, a meeting will be organised, taking the requirements of the COVID-19 Regulations into account.	
INTERESTED PARTIES X				

10 Baseline Characterisation

This section provides a general overview of the status quo of the environmental and social context within which the proposed project is located. All of the proposed activities will take place within the affected properties. While most of the descriptions below are focused on the site itself, where necessary the regional context of the environmental features is also explained. For each environmental aspect discussed below, proposed environmental issues/impacts have been highlighted qualitatively where applicable. The EIA will explore these issues on a quantitative level.

10.1 Geographical

The proposed project area is situated in the Kai !Garib Local Municipality's area of jurisdiction, within the ZF Mgcawu District Municipality, Northern Cape Province (Figure 10-1). The LM consists of 3 large towns: Kakamas, Keimoes and Kenhardt.

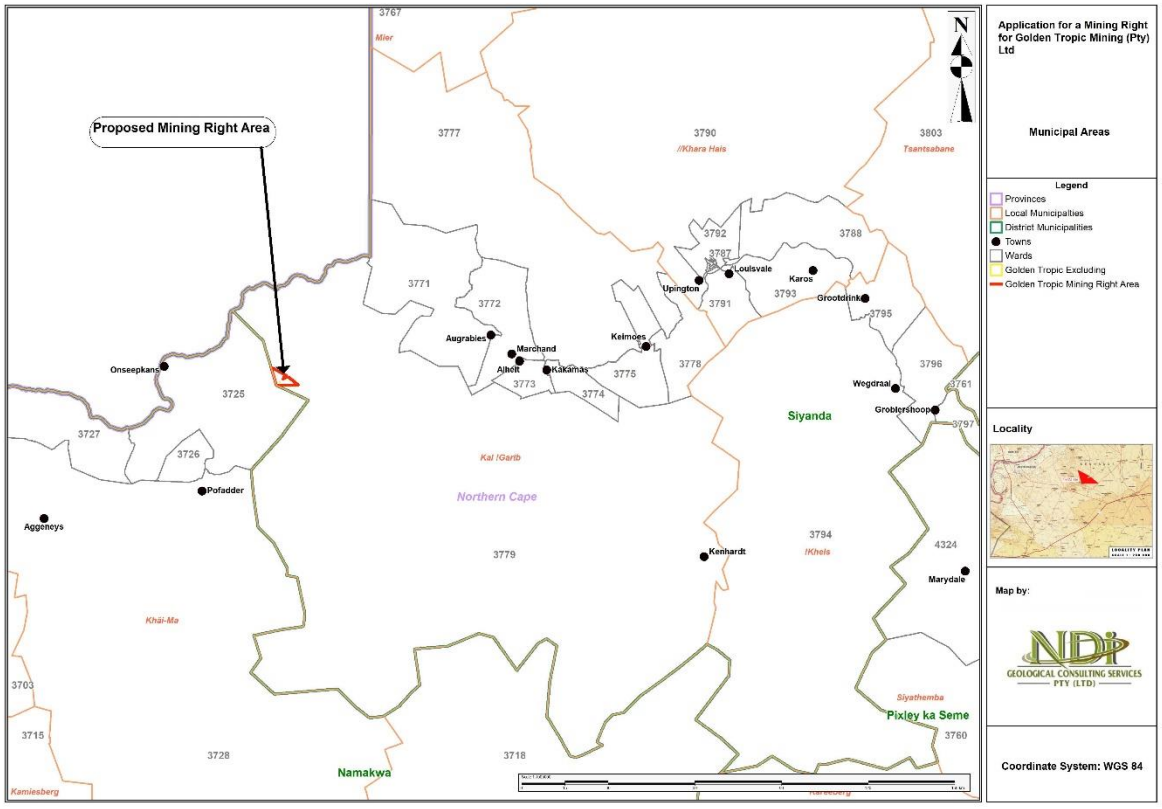


Figure 10-1: Municipal Areas

10.2 Topography

The 20 m contours show that the north-eastern section of the project site has a flatter gradient compared to the north-western, south western and south-eastern sections (Figure 10-2).

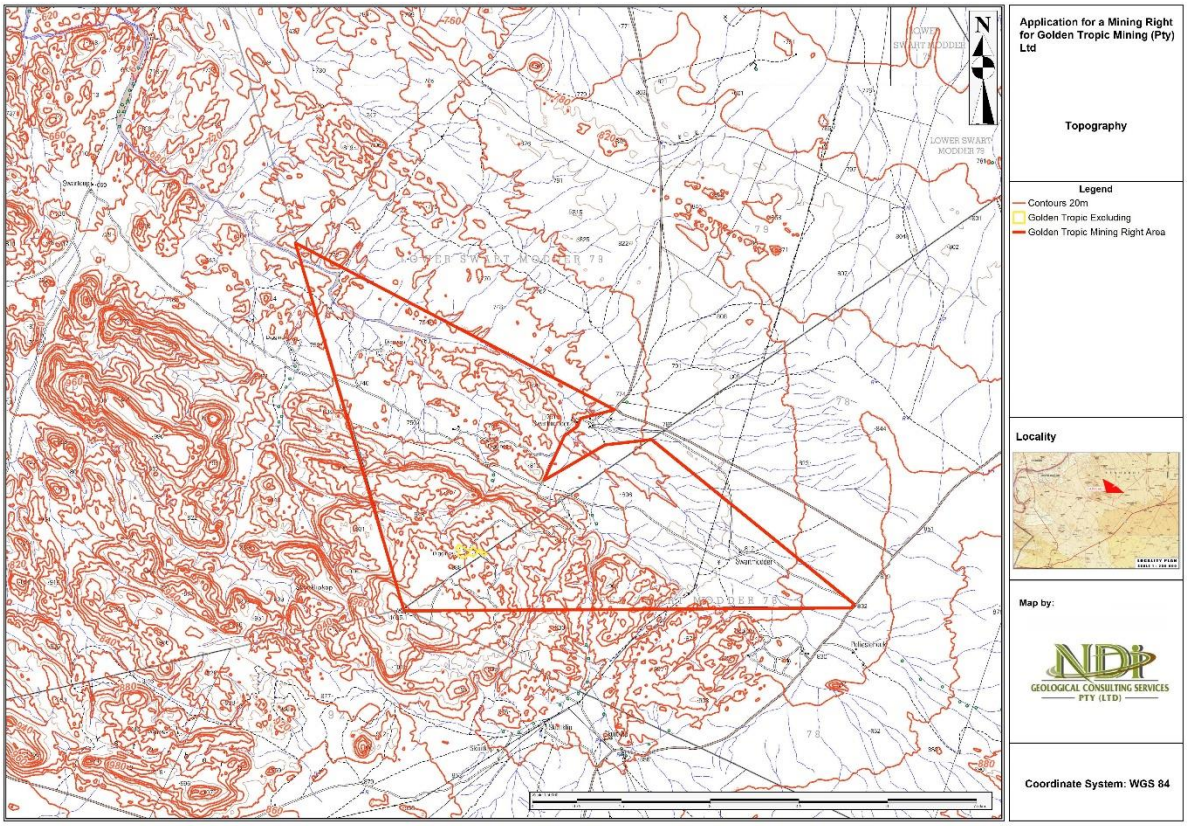


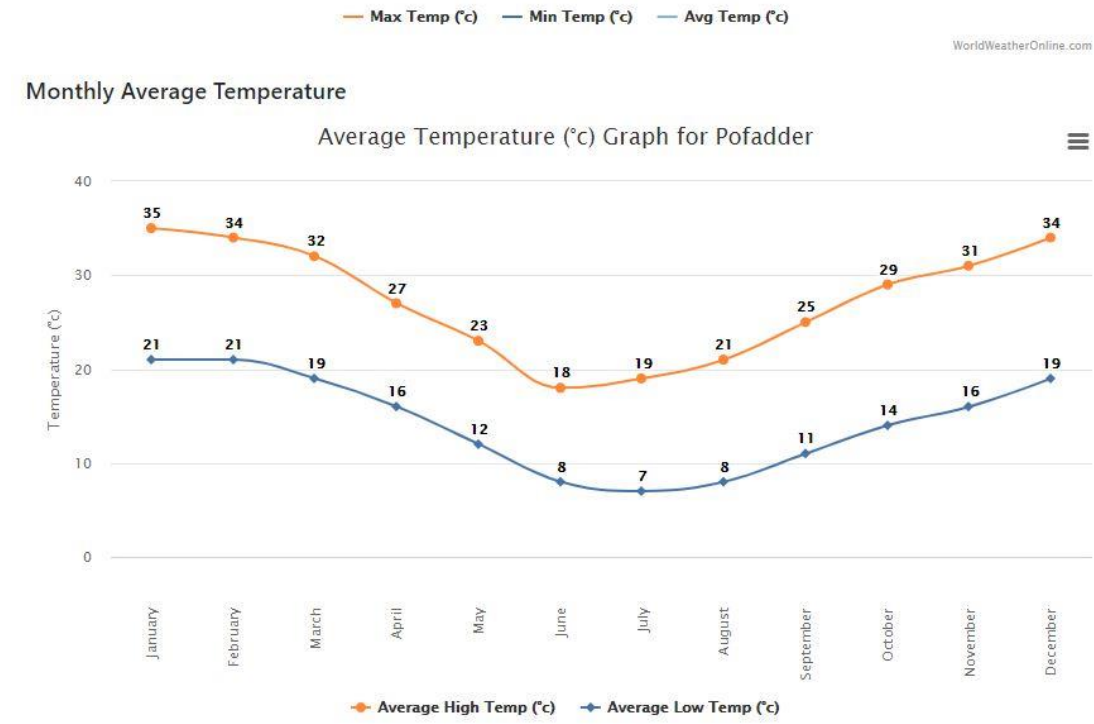
Figure 10-2: Topography

10.3 Climate

The climate is continental and is little affected by the ameliorating influences of the oceans. It is an arid biome, where most of the rivers are non-perennial, apart from the Orange River and the few permanent streams in the south-west that originate in the neighbouring higher rainfall areas.

10.3.1 Average Monthly Temperatures

The average monthly temperatures (Minimum and Maximum) as received from Pofadder are indicated in Figure 10-3.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)	AVERAGE MONTHLY TEMPERATURES FOR POFADDER

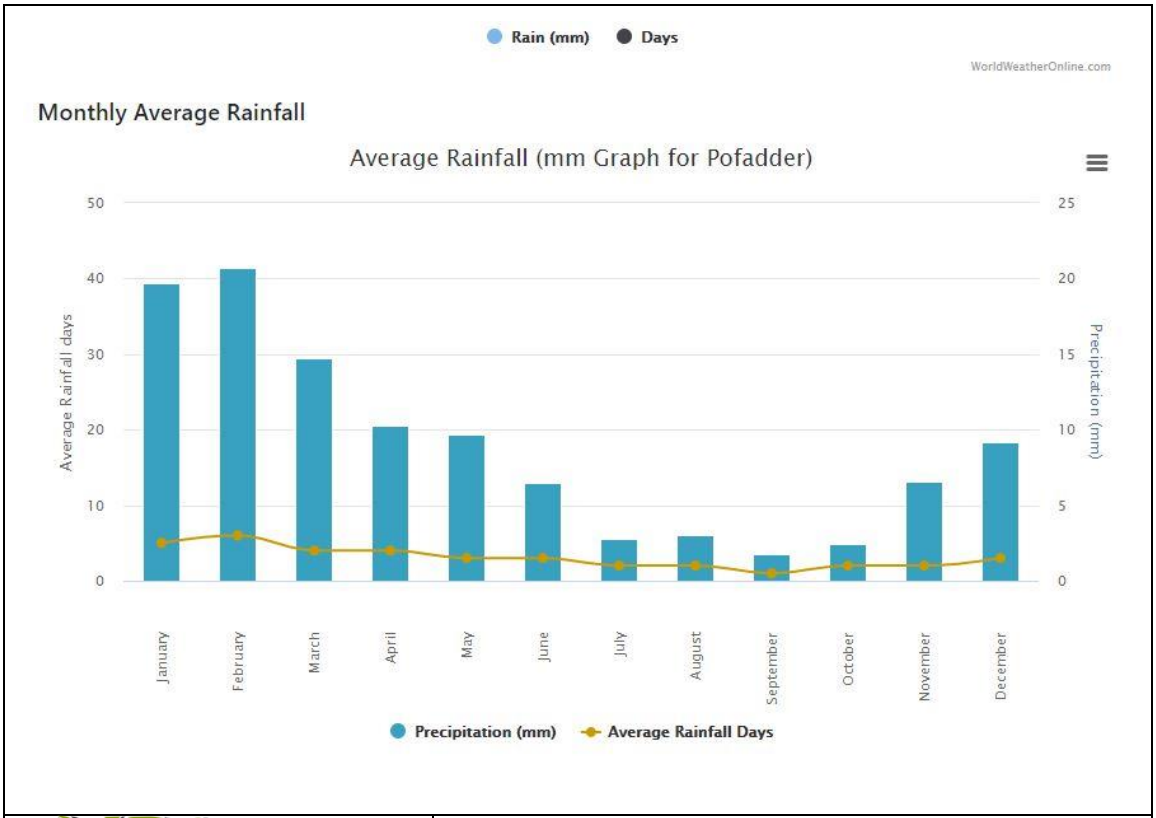
Figure 10-3: Average Monthly Temperatures for Kimberley (Source: Weather SA)

The figure indicates that:

- The highest maximum temperature is experienced during December, January, February and March where the average maximum goes beyond 32 °C.
- The coldest months of the year are June and July, where the average temperature drops well below 10 °C.

10.3.2 Average Monthly Rainfall

Figure 10-4 indicates the average monthly rainfall for the region.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)

AVERAGE MONTHLY RAINFALL FOR POFADDER

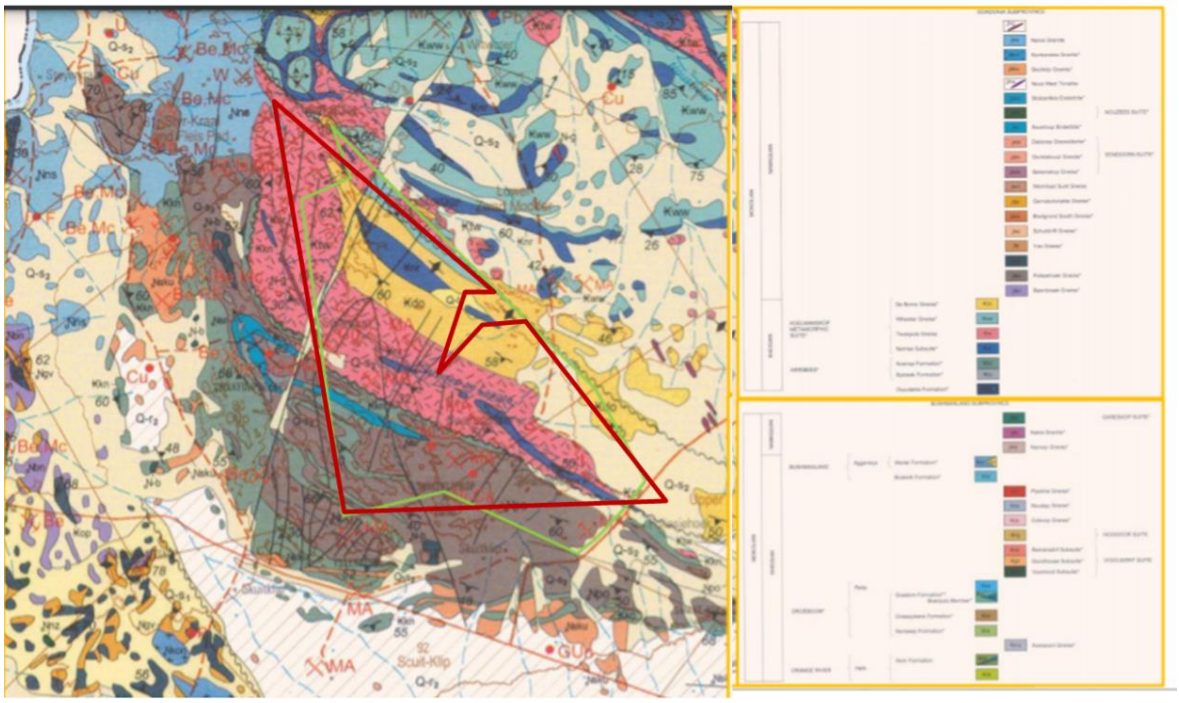
Figure 10-4: Average Monthly Rainfall for Kimberley (Source: Weather SA.)

The average monthly rainfall data indicates that:

- The highest rainfall months are January to February with an average of ±20mm; and
- The dry months are June and September with an average of below 5mm.

10.4 Geology

The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology. The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Figure 10-5 shows the geology of the property.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)	GEOLOGY

Figure 10-5: Local Geology

10.5 Surface Water Resources and Hydrology

The project is located within quaternary catchments, which include C81E (located within the Lower Orange Water Management Area (WMA) (Figure 10-6). The local hydrology of catchment D81E is characterised by the non-perennial Samoep River which starts within the quaternary catchment, drains the study area before joining the Orange River north west of the proposed project (Nyamoki Consulting, 2021).

The Samoep River and several tributaries and drainage lines traverse the project area (Figure 10-7). Regional hydrology is defined by the Samoep River that drains through the study area from quaternary catchment D81E to Orange River to the north west of the mining area. The catchment properties of Samoep River are provided in Table 10-1.

Table 10-1: Catchment Properties

Catchment Area (km^2)	0.001325
Length of Longest Watercourse (km)	48
Elevation Difference (m)	(200–400)
Mean Annual Precipitation (mm/annum)	144

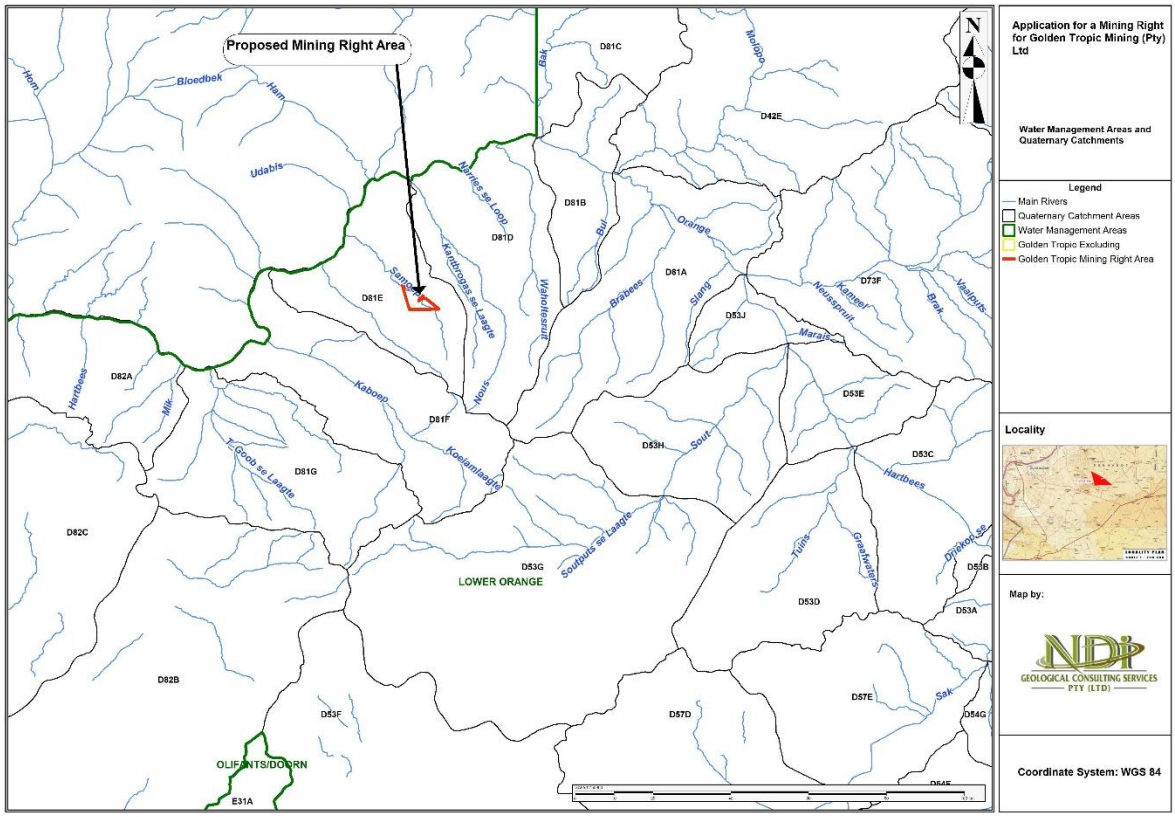


Figure 10-6: Water Management Areas and Quaternary Catchment Areas

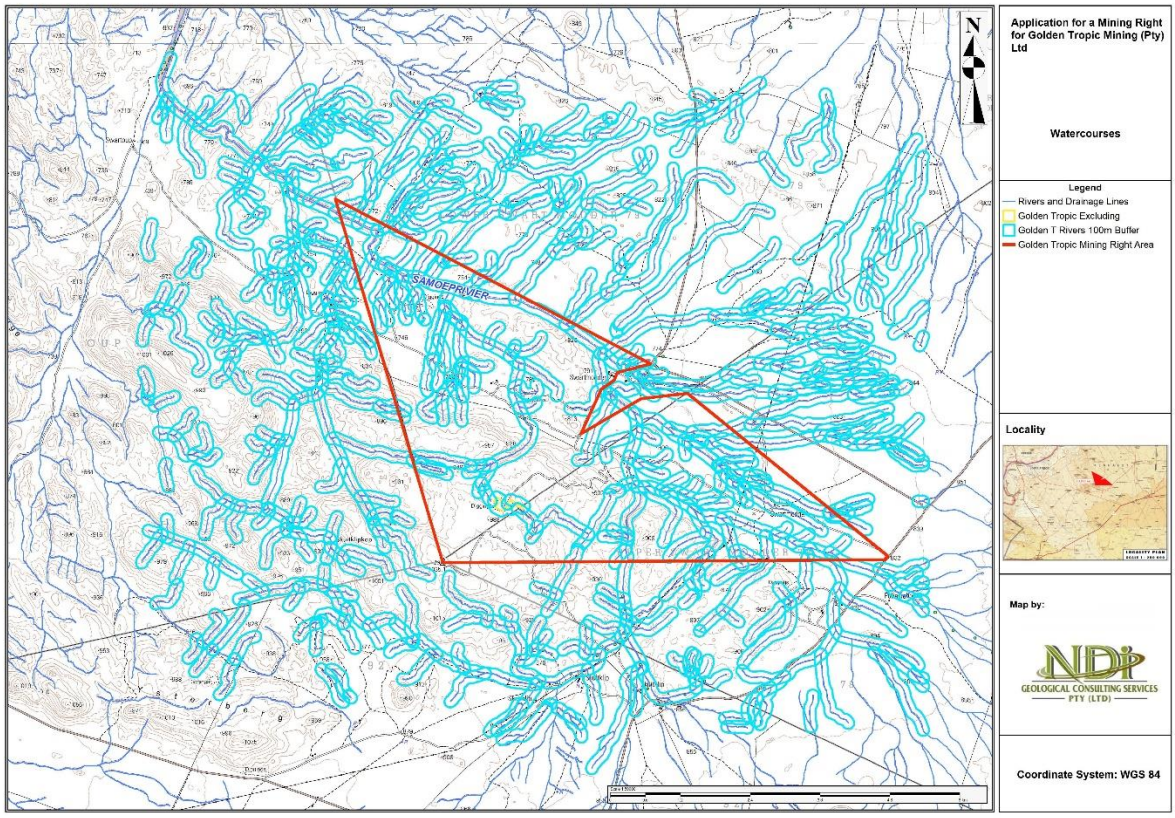


Figure 10-7: Rivers, Streams and Drainage Lines

The Samoep River is not considered a Freshwater Ecosystem Priority Area (FEPA). According to the SANBI NFEPA (2011), the affected quaternary catchment areas are not regarded as important in terms of fish sanctuaries, rehabilitation or corridors.

In addition, the project area is also not considered important in terms of translocation and relocation zones for fish.

The results from the floodline determination process are provided in the Figures below (Nyamoki Consulting, 2021).

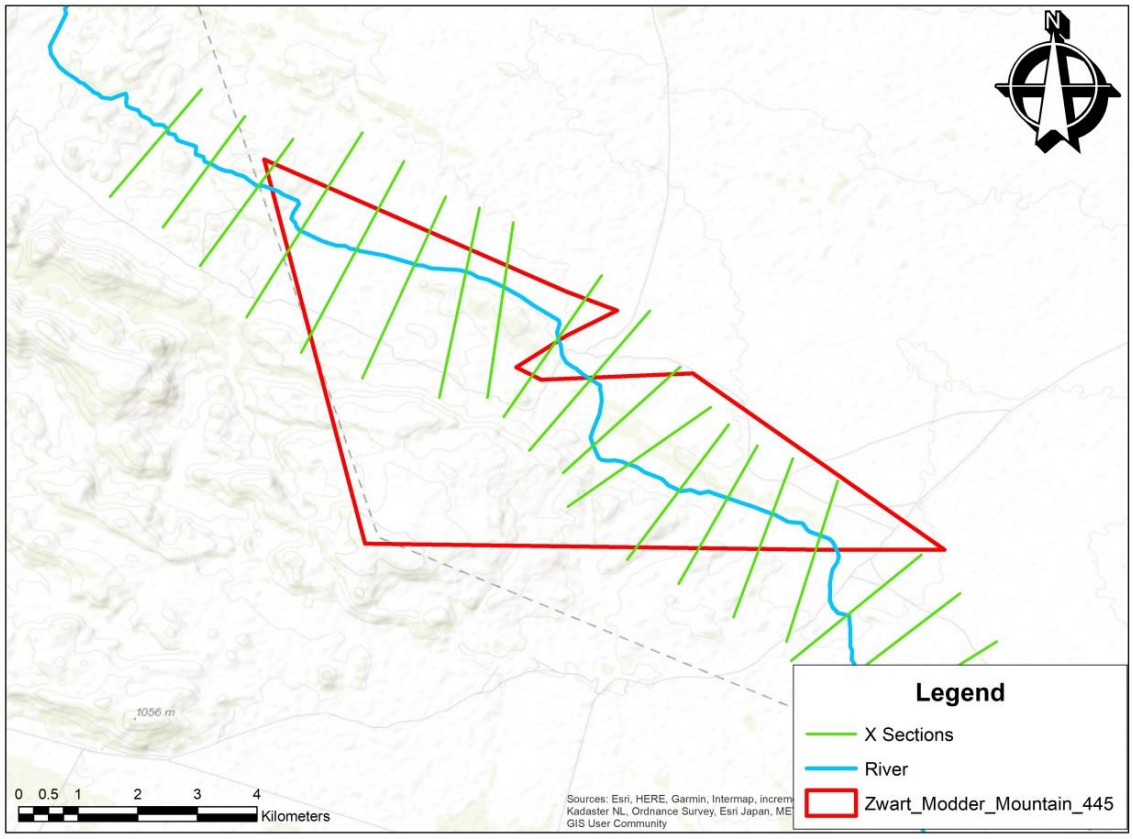
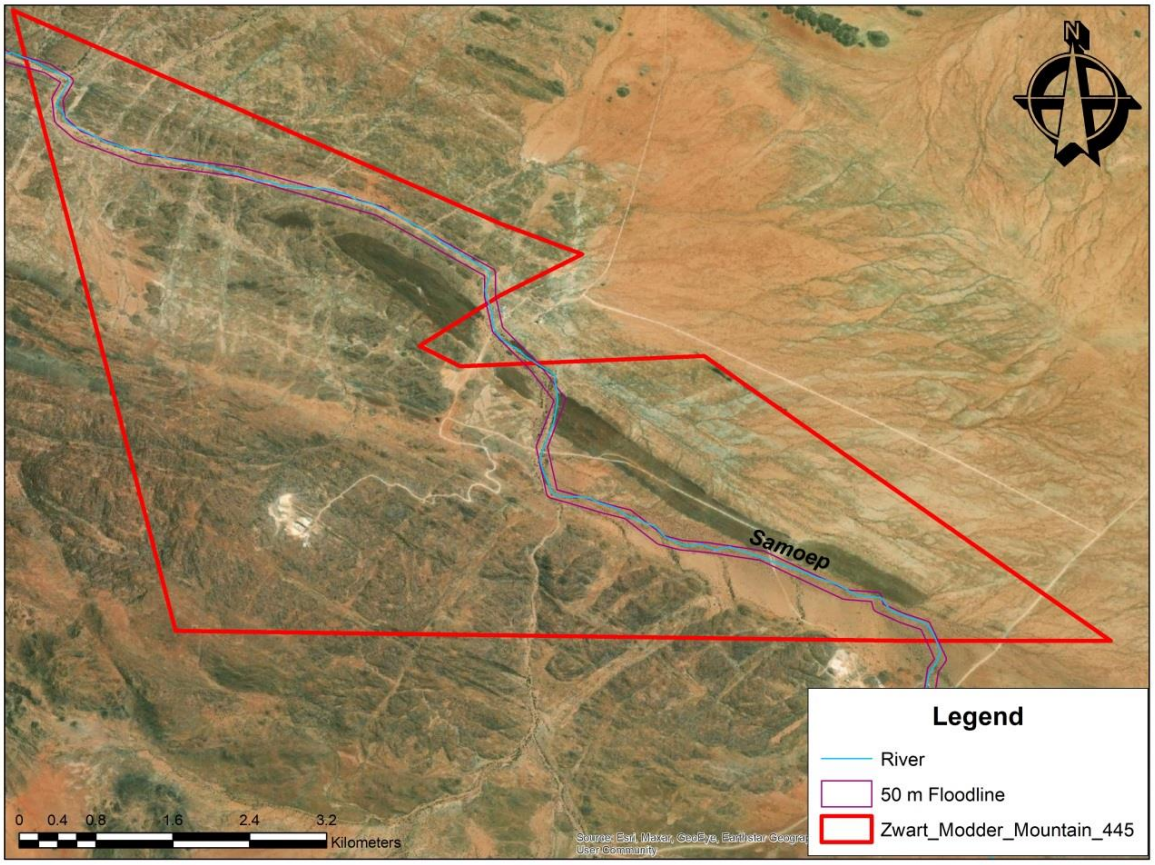
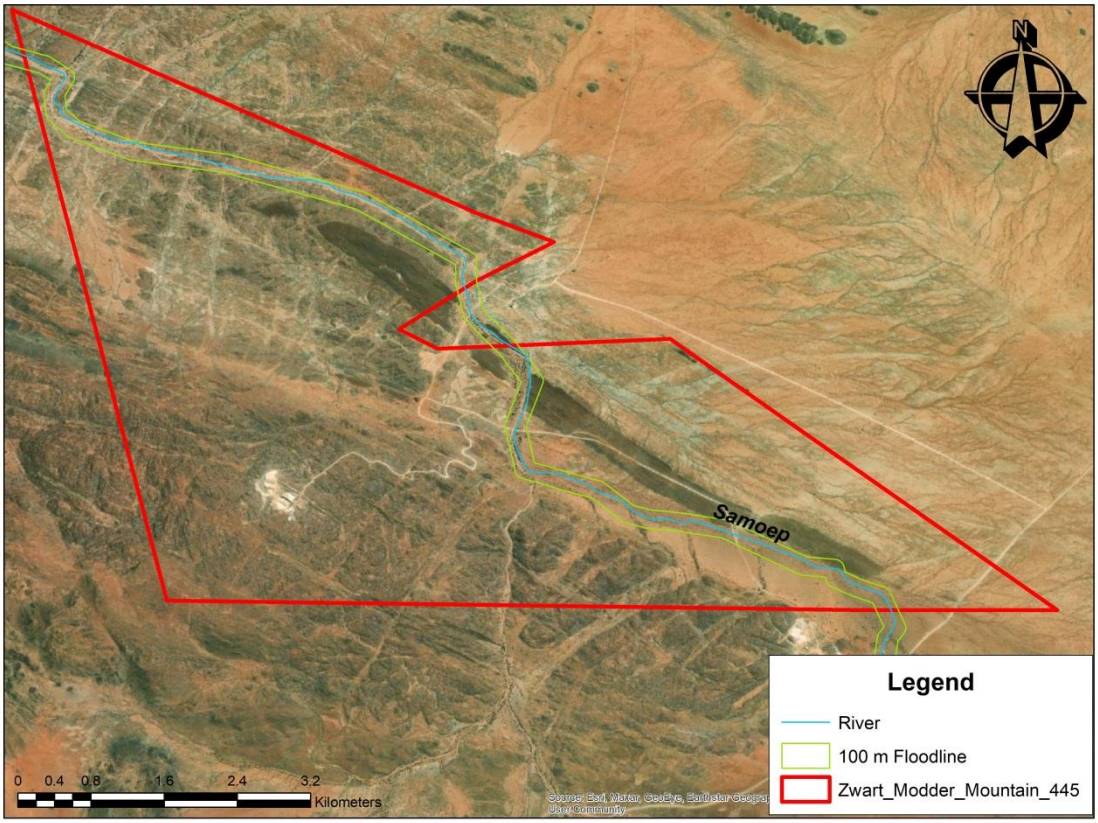


Figure 10-8: Areas that would be inundated by the 50-year and 100-year Floods



GEOLOGICAL CONSULTING SERVICES PTY (LTD)	50-YEAD FLOODLINES

Figure 10-9: 50-year floodline



GEOLOGICAL CONSULTING SERVICES PTY (LTD)

GEOLOGY

Figure 10-10: 100-year floodline.

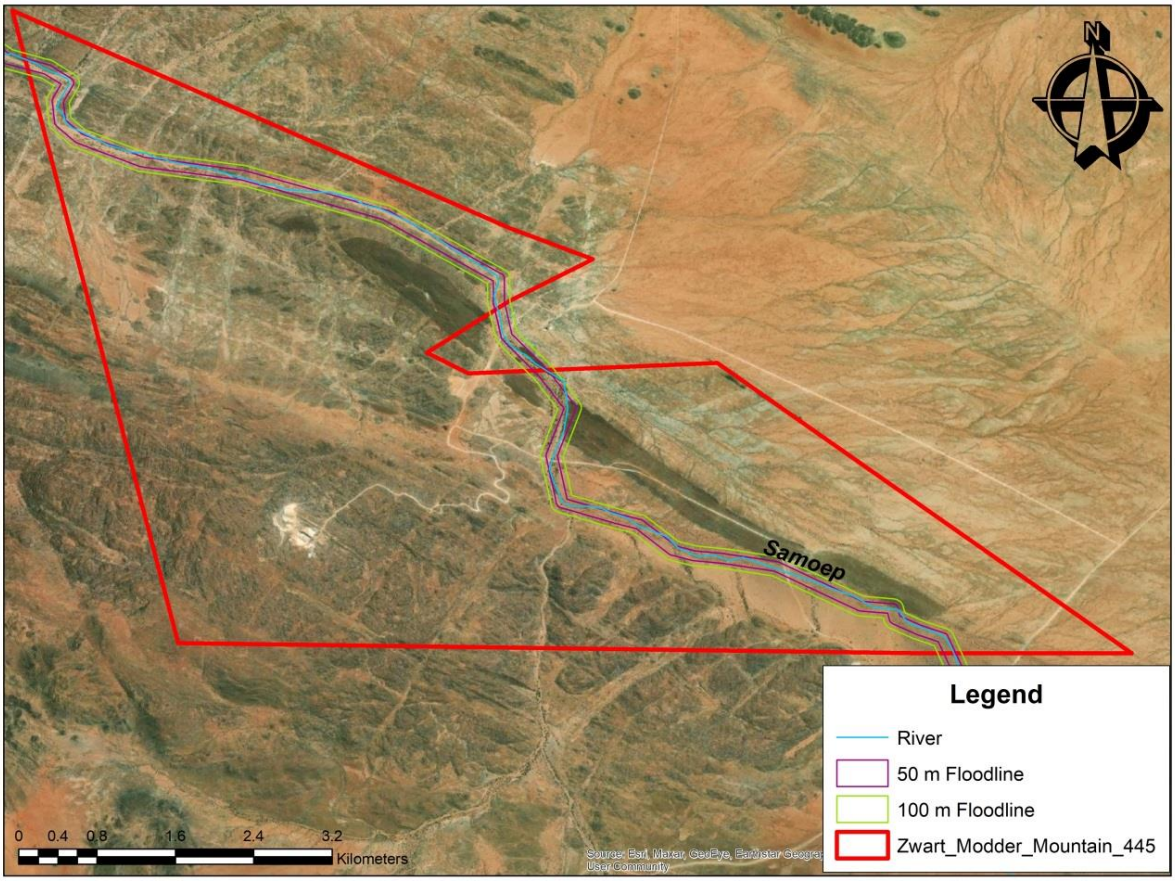


Figure 10-11: Floodline map of the study area

10.6 Wetlands

The SANBI data shows that there are no wetlands occurring on the study area.

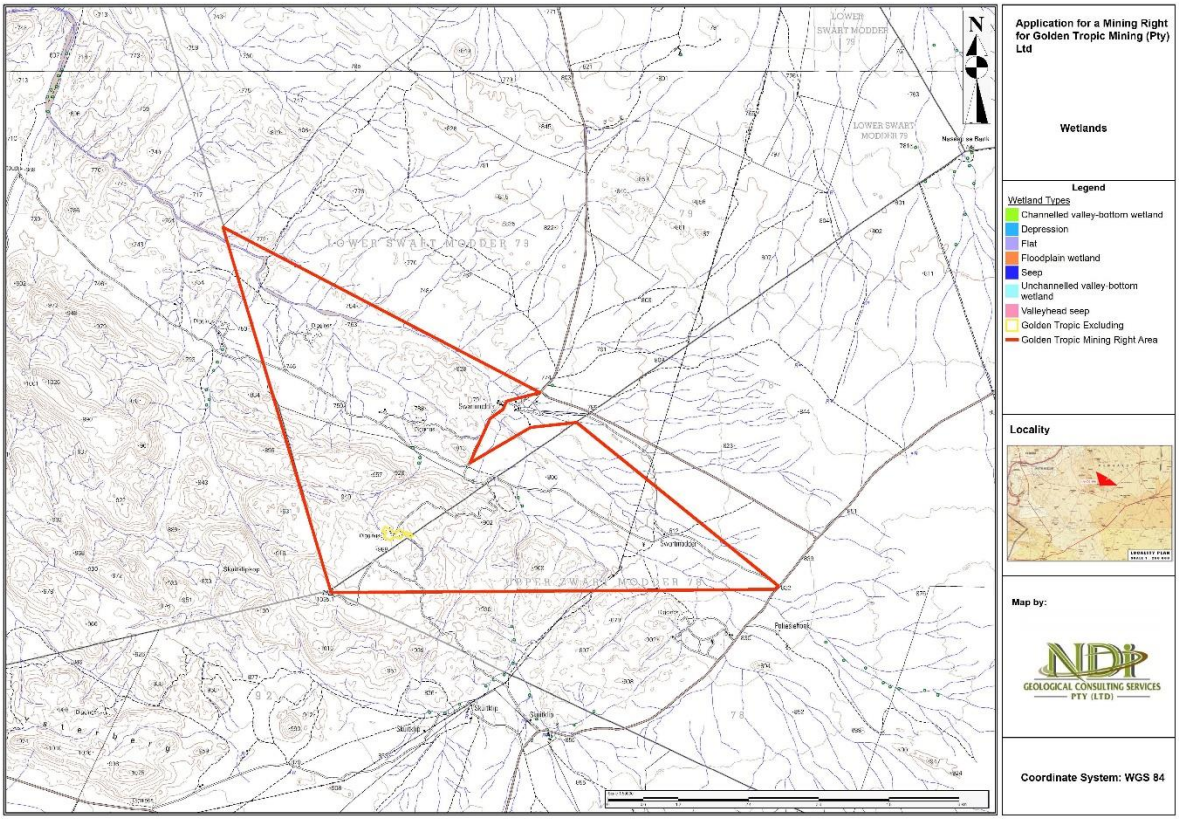


Figure 10-12: Wetland Types

10.7 Groundwater

A specialist hydrogeology study was undertaken for the project.

10.7.1 Hydrocensus

A hydrocensus followed the desktop study to establish boreholes information in the region of the site. Figure 5 below gives the position of the groundwater hydrocensus information. The boreholes marked in blue are the boreholes from which groundwater abstraction can take place. These boreholes marked in blue can also be used as groundwater monitoring points (Nyamoki Consulting, 2021).

Nine boreholes are currently equipped and can be used for mining activities. The boreholes are used for short term after which the use is diverted to another borehole to be able to spread the load on the aquifer. The water levels depths measured in the boreholes range from 10.76 to 28.47 metres below ground. From Figure 10-13 it can be see that the boreholes are located on the fractured structures and are also located to the drainage features which are filled with gravel load of the river and the fractures crossing with the river. Figure 10-13 provides a map of the boreholes in relation to the topography and the drainage systems. Table 10-2 provides a summary of the geohydrological information regarding the boreholes.

Table 10-2: Borehole Geohydrological

BH No.	Coordinates			Water Levels (mbgl)	Groundwater Elevation (mamsl)	Remarks
	Latitude	Longitude	Ground water Levels (mamsl)			
Boreholes located on the Zwart Modder Mountain Mine						
P1 Kudu Pump	-28.78428	019.65289	719	10.30	709	Groundwater production borehole equipped with a 1.5kw submersible pump. Solar power. Borehole submitted to the yield testing procedures
P2 Cape Autumn	-28.78380	019.65684	718	13.2	705	Groundwater production borehole equipped with a 1.5 kw submersible pump.
P3 HQ Pump	-28.81882	019.69684	766	-----	-----	Groundwater production borehole equipped with a 1.5 kw submersible pump.
P4 Red Solar Pump	-28.81882	019.70043	778	11.73	766	Groundwater production borehole equipped with a 1.5kw submersible pump. Solar power. Borehole submitted to the yield testing procedures
P5 Fresh Water Pump	-28.81417	019.69065	794	------	-----	Groundwater production borehole equipped with a 1.5 kw submersible pump.
P6 Blue Pump	-28.80731	019.67887	765	25.64	739	Groundwater production borehole equipped with a 1.5 kw submersible pump.
P8 Pink Pump 1	-28.83660	019.73012	831	19.1	812	Not currently in use. Groundwater production borehole equipped with a 1.5 kw submersible pump. Borehole submitted to borehole yield testing procedure
P9 Pink Pump 2	-28.83725	019.72542	833	-------	-----	Groundwater production borehole equipped with a 1.5 kw submersible pump.
P10 Pink Pump	-28.83059	019.72203	815	11.14	804	Groundwater production borehole equipped with a 1.5kw submersible pump. Solar power. Borehole submitted to the yield testing procedures
Windmill 1	-28.79188	019.70574	779	19.22 Dynamic	760	Solar submersible pump with disconnected windmill
Windmill 2	-28.79213	019.70500	778	10.76	767	Windmill with broken pump. No abstraction
BH11 Casing only	-28.81167	019.68793	785	28.47	757	Casing only. Near the pump station

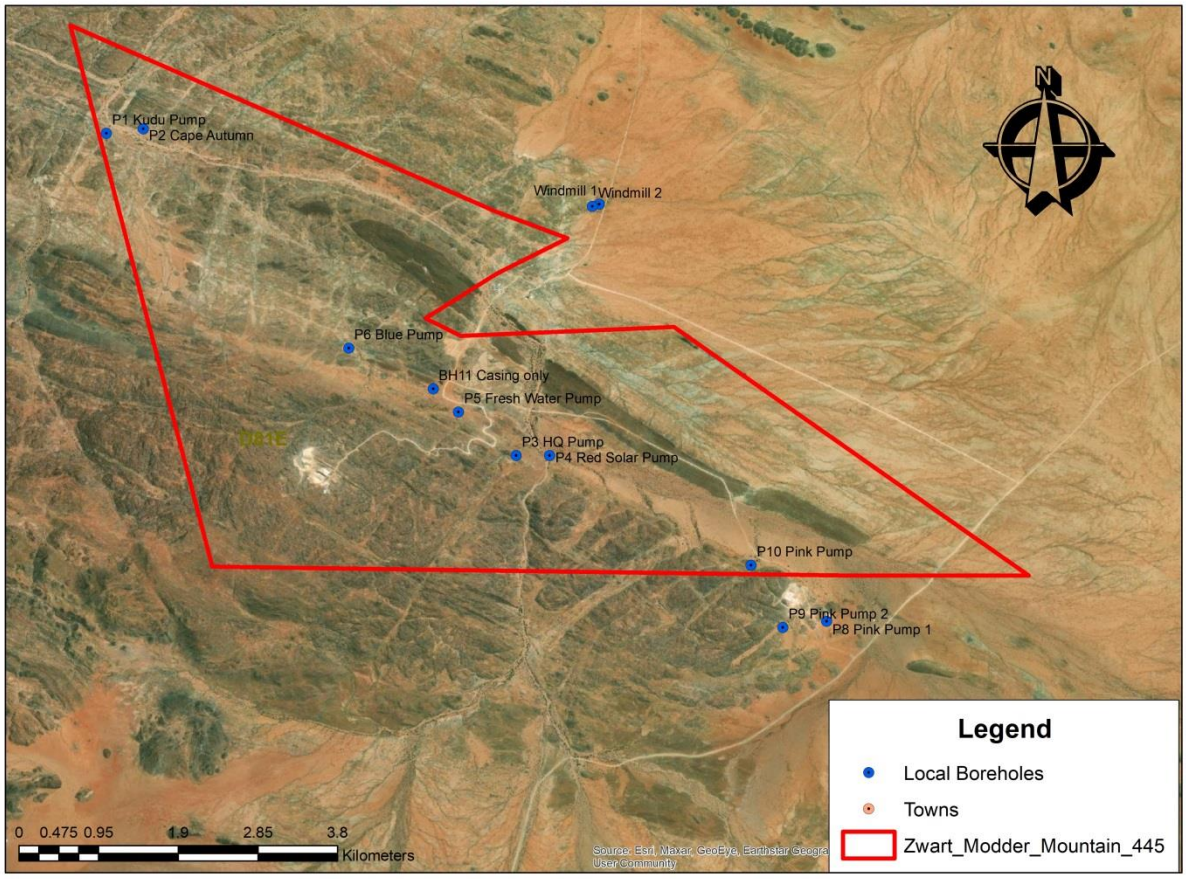


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Figure 10-13: Local Boreholes Hydrocensus

10.7.2 Testing pump of existing production boreholes

The four boreholes namely Pump 01, 04, 08 and 10 were submitted to borehole yield testing procedures during the study (Nyamoki Consulting, 2021).

The boreholes were submitted to a Constant Discharge Test with a recovery test to follow the constant yield test. The borehole yield test was conducted according to SANS 0299-4:2003. Part 4: Test pumping of the water boreholes and the publication of the Department of Water Affairs and Forestry. “Minimum Standards and guidelines for Groundwater Resource Development for the Community Water Supply and Sanitation Programme”.

The Constant Discharge Test consist of pumping borehole at a specific rate for a duration as long as possible, with a sudden switch off of the pump after the pump cycle, with the recovery test following immediately afterwards. The Constant Discharge Curves was analysed by using the Basic FC, FC inflection point, Cooper-Jacob and Barker/Bangony methods, to give an indication of Transmissivity and Storativity values.

Boreholes Pump 01 also called the Kudu pump has a static water level at 10.30 metres below ground level. The borehole was submitted to a constant discharge test with duration of 10 minutes at a rate of 0.58l/s. The pump was switch off after 10 minutes. The water level drawn down was measured at 39.7

metres below the original static water level. A maximum inflow into the borehole of 0.07l/s was measured at the end of the test.

The borehole was allowed to recover for 180 minutes or 3.0 hours. The water level recovery back to 0.07 metres below the original water table. This can be regarded as slow recovery rate.

Borehole Pump 04 was also called the Red Solar Pump has a static water level at 11.73 metres below ground levels. The borehole was submitted to a constant discharge test with duration of 40 minutes at a rate of 0.88l/s. The pump was switched off after 40 minutes. The water level drawdown was measured at 2.12 metres below the original static water level. A maximum inflow into the borehole of 0.67l/s was measured at the end of the test.

The borehole was allowed to recover for 210 minutes or 3.5 hours. The water level recovered back to the original water table in the 3.5 hours recovery. This can be regarded as a slow recovery rate.

Borehole pump 08 also called the Pump 1 has a static water level at 38.56 metres below ground level. The borehole was submitted to a constant discharge test with duration of 20 minutes. The water level drawdown measured at 12.16 metres below the original water level. A maximum inflow into the boreholes of 0.23l/s was measured at the end of the test.

The borehole was allowed to recover for 1020 minutes or 17 hours. The water level recovered back to the original water table. This can be regarded as slow recovery rate.

Borehole Pump 10 also called the Pink Solar Pump has a static water level at 11.14 metres below ground level. The borehole was submitted to a constant discharge test with duration of 540 minutes or 9 hours at a rate of 0.32l/s. The pump was switched off after 540 minutes. The water level drawdown was measured at 28.69 metres below the original static water level. A maximum inflow into the borehole could not be measured. The borehole did not reach pump inlet.

The borehole was allowed to recover for 960 minutes or 16.0 hours. The water level recovery back to the original water table. This can be regarded as slow recovery rate. The information on the yield test of the borehole pump 01, 04, 08 and 10 is provided in Table 10-3.

Table 10-3: Pump testing results

BH No BH Depth & Static Water Level	Step Test				Constant Discharge Test			Comments
	Step No.	Rate (l/s)	Dur. (Min)	D/D (min)	Rate (l/s)	Dur. (Min)	D/D (m)	
Pump 01 Static water level 10:30m Date 01 June 20	----	-----	-------	------	0.58	10	39.7	99.9% in 180 min
Pump 04 Static Water Level:11.73m Date tested 29 May 2018	----	-----	-------	------	088	40	2.12	100% in 210 min
Pump 08 Static Water Level: 38.56m Date tested: 19 June 2018	----	-----	-------	------	0.30	20	12.16	100% in 1020 min
Pump 10 Static water level: 11.14m Date test: 19 June 2018	----	-----	-------	------	0.32	540	28.69	100% in 960 min
ST- Step Test CDT- Constant Discharge Test SWL- Static Water Level in metres below ground level					Dur.- Duration D/D- Drawdown			

10.7.3 Borehole abstraction figures

The Constant Discharge Curves of the test was analysed by utilising the Basic FC, FC inflection point, Cooper-Jacob, Theis and Barker/Bangoy method, to give an indication of Transmissivity and Storativity

values. The average abstraction rate (based on the 24 hours duty cycle) of these methods were taken to calculate the yield for 12 hours per day.

The abstraction rate for the borehole is given for each individual method described above. The average recommended (interpreted from all data available) abstraction rate for the borehole is given in Table 3 below. It is important to understand that the abstraction figures provided in Table 10-4 only make provision for the aquifer parameters of the boreholes in the area, groundwater recharge that may or may not be enough or groundwater catchment size limitations. These abstraction figures below use assumptions such as a limitless catchment area size and no interference or abstraction from other boreholes in the area (Nyamoki Consulting, 2021).

A summary of the methods used for the abstraction rates and the Graphical presentations of the drawdown curves and recovery curves can be found in Table 10-4.

Table 10-4: Recommended abstraction for production boreholes (FC Method)

BH No.	Recommended Abstraction Rate		Dynamic water Level (mbcl)	Comments
	For 10h/d	in m3/d		
P1 Kudu Pump	0	---	NA	Low yielding
P4 Red Solar Pump	0.7	25.2	13.5	To be used as production Borehole
P8 Pink Pump 1	0	---	NA	Low yielding
P10 Pink Solar Pump	0.25	9.0	38	To be used as production Borehole
Total		34.2	----	---

10.7.4 Groundwater Quality

During the groundwater study water samples were collected from four boreholes namely Pump 01, Pump 04, Pump 08 and Pump 10. These four boreholes are regularly used for mine for cutting machine cooling purposes. The water samples were preserved and delivered to Aquatico Laboratories, an accredited water laboratory, to be analysed for water quality purposes. The analyses include the major cation and anions and BTEXN and TPN parameters samples on Pump 08. The results of the chemical analysis performed on the groundwater sample are presented in Table 10-5. The quality of water is classified according to the SANS 241 1 and 2:2015 as in the Publication “South African National Standard” Part 1 and Part 2, SABS.

Table 10-5: Risk Guideline legend

Aesthetic	Determinand that taints water with respect to taste, odour and color and that does not pose an unacceptable health risk if present at concentration values exceeding the numerical limits specified.
Operational	Determinand that essential for assessing the efficient operation of treatment systems and risks to infrastructure.
Acute Health 1	Routinely quantifiable determinand the poses an immediate health risk if consumed with water at concentration values exceeding the numerical limits specified.
Acute Health 2	Determinand that is presently not easy quantifiable and lacks information pertaining to viability and human infectivity which, however, does pose immediate unacceptable health risk if consumed with water at concentration values exceeding the numerical limits specified.
Chronic Health	Determinand that poses an unacceptable health risk if ingested over an extended period if present at concentration values exceeding the numerical limits specified.

	Exceeds Acute health – 1, Acute health – 2 and Chronic health guideline values.
	Exceeds only Operational and Aesthetic guideline values.

Borehole Pump 01, 04, 08 and 10 show elevated levels of Electrical Conductivity, Total Dissolved Solids, Sodium, Chloride, Sulphate and Fluoride which is above the standards limits. The four water sources cannot be used for domestic purposes. The water can be used for cooling the cutting blades. The water need to be treated with reserve osmosis prior to human consumption. This method will remove the chemical and bacteriological parameters that are too high for domestic and human consumption.

10.7.5 Hydrocarbon count

Borehole Pump 08 is does have a positive Hydro-carbon count. This borehole is a low yielding borehole not earmarked to be used. The water quality results from the hydrogeology assessment are provided in Table 10-6.

Table 10-6: Water quality of Pump 01, 04, 10 and 08

Parameters	Units	SANS 241: 2015	Domestic DWS	DWS irrigation (1996)	BH01	BH04	BH08	BH10
pH	pH	6.5-8.4	4.5/10.0	5.0-9.7	7.72	7.86	7.96	7.95
Electrical Conductivity (EC)	mS/m	90	150	170	473	472	1087	1089
Total Dissolve Solids (TDS - cal)	mg/l		1000	1200	2788	2793	7067	6967
Alkaline (Alk)	mg CaCO3/l				199	204	247	243
Chloride (Cl)	mg/l	300	200	300	893	887	2753	2827
Sulphate (SO4)	mg/l	500	400	500	835	806	1793	1661
Nitrate (NO3)	mg/l	11	10	11	7.01	6.89	10.4	11
Ammonia (NH4)	mg/l	1.5		1.5	0.082	0.057	0.072	0.108
Fluoride (F)	mg/l	1.5	1	1.5	2.01	1.95	2.98	3.01
Calcium (Ca)	mg/l		150		341	348	553	570
Magnesium (Mg)	mg/l		100		71.4	74.3	215	232
Sodium (Na)	mg/l	200		200	490	517	1506	1471
Potassium (K)	mg/l	50			3.96	4.06	8.54	7.39
Aluminium (Al)	mg/l	0.3		0.3	-0.002	-0.002	0.106	-0.002
Iron (Fe)	mg/l	0.3	1	2	-0.004	-0.004	-0.004	-0.004
Manganese (Mn)	mg/l	0.1	0.4	0.5	0.024	0.025	-0.001	0.014
Chromium (Cr)	mg/l	0.05		1	-0.003	-0.003	-0.003	-0.003
Copper (Cu)	mg/l	2	1.3	0.2	0.021	0.018	0.359	0.012
Nickel (Ni)	mg/l	0.07		2	-0.002	-0.002	-0.002	-0.002
Zinc (Zn)	mg/l	5	5	1	0.064	0.07	0.132	-0.002
Cadmium (Cd)	mg/l	0.003	0.005	0.1	-0.002	-0.002	0.128	-0.002
Lead (Pb)	mg/l	0.01		0.2	-0.004	-0.004	-0.004	0.041
Ecoli	CFU/100ml	0	1		-1	-1	-1	-1
Total coliform	CFU/100ml	10	10		-1	-1	-1	-1

Parameters	Units	SANS 241: 2015	Domestic DWS	DWS irrigation (1996)	BH01	BH04	BH08	BH10
NTU	NTU	1	1		0.668	0.827	0.164	0.203
Total Hardness (Thard - cal)	mg CaCO3/l		300		1145	1175	2269	2376
Total Organic Carbon (TOC)	mg/l	10			1.86	1.76	6.03	6.01
Cyanide Screening	mg/l				-1.1	-1.1	-1.1	-1.1
Langelier Saturation Index - cal	LSI				0.52	0.68	1.02	1.02

Piper diagram

A Piper Diagram uses the relationship of chemical parameters to classify water samples according to their dominant cations and anions, as well as allowing for the grouping of water according to hydrogeological facies. The Piper Diagram uses concentrations calculated in meq/L to represent a percentage of the total cations or anions. The cations and anions of each sample are plotted on the respective triangular plot and the points are then projected onto the central diamond graph (Figure 10-14). Depending on where the sample point falls on the diamond graph, basic assumptions can be attributed to the sample, and for this reason the diamond graph is divided into quarters. Displaying numerous water qualities of the same sample on one plot gives an understanding of the changes occurring over time (if any), whilst displaying multiple samples together provides a basis for comparison.

The left quarter in a Piper Diagram represents freshly recharged water, dominated by calcium magnesium- bicarbonate signature. The right quarter is associated with stagnant or slow-moving groundwater and is dominated by sodium and chloride. The bottom quarter is typical of dynamic groundwater flow and is dominated by sodium and bicarbonates; and the top quarter typically indicates contamination and is dominated by sulphate.

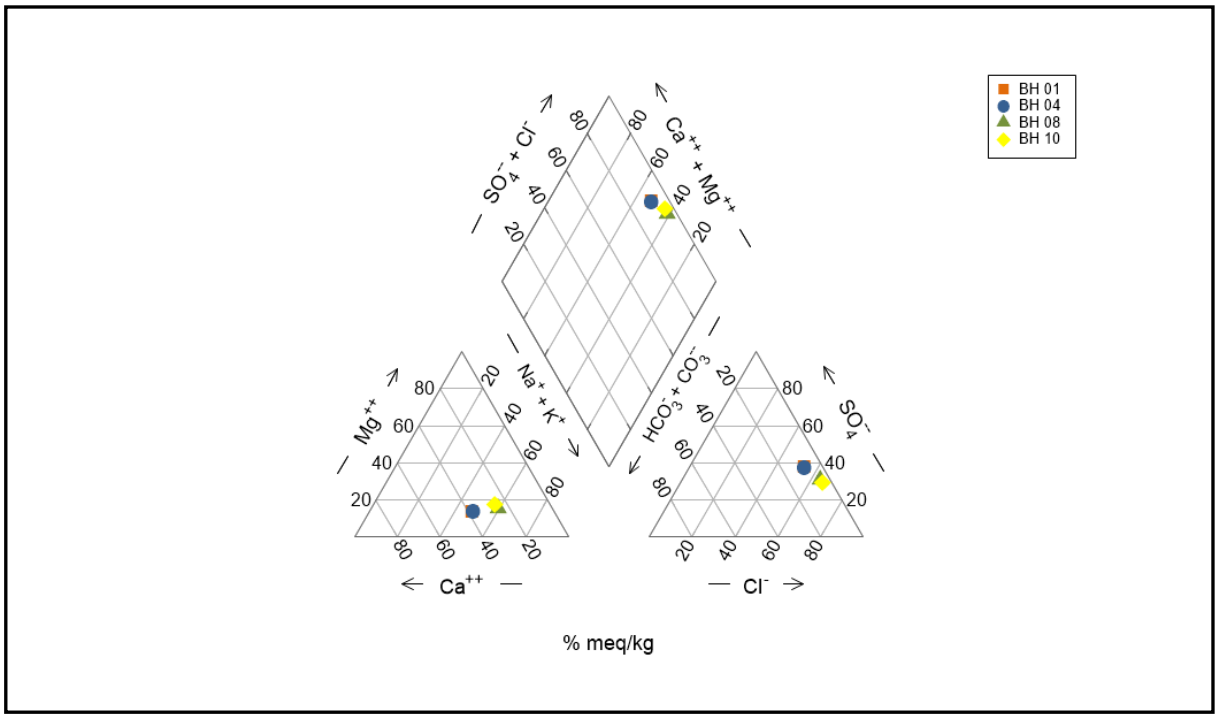


Figure 10-14: Piper diagrams representing groundwater type.

The results of the chemical analysis for the Mine were plotted on a Piper diagram as indicated in Figure 6 above. The water samples identified as BH01, BH04, BH08, and BH10 were collected from groundwater. These diagrams were developed to investigate the source of its dissolved salts, and

explain the different processes affecting the surface water characters. The subdivisions of the diamond field represent seven water-type categories of natural waters. The groundwater water types of the Mine in the study area are characterized by alkaline earth, water showing an increase in alkali with prevailing sulphate and chloride ions.

10.7.6 Groundwater level depth

The water level depth information of eight boreholes is available in the area. The eight data points are not enough to construct groundwater level contours for the area due to the large area over which these data points are spread. The water level depth in the boreholes ranges from 10.3 metres below ground level to 28.47 metres below ground level. For all practical reasoning the water level follows the topography of the area.

10.7.7 Onsite surface water drainage and groundwater movement

The surface elevations can be used to understand the groundwater flow directions. From the drainage patterns it can be seen that the boreholes are located along these drainage systems and that the main water drainage is towards the mine site borehole it flows further to the Orange River to the north west of the farm. From a regional perspective the drainage is from the high laying areas in the south east towards the Orange River in the North West. The light blue arrows on Figure 10-15 show the expected groundwater flow directions in the area inside the groundwater catchment area of the mine boreholes.

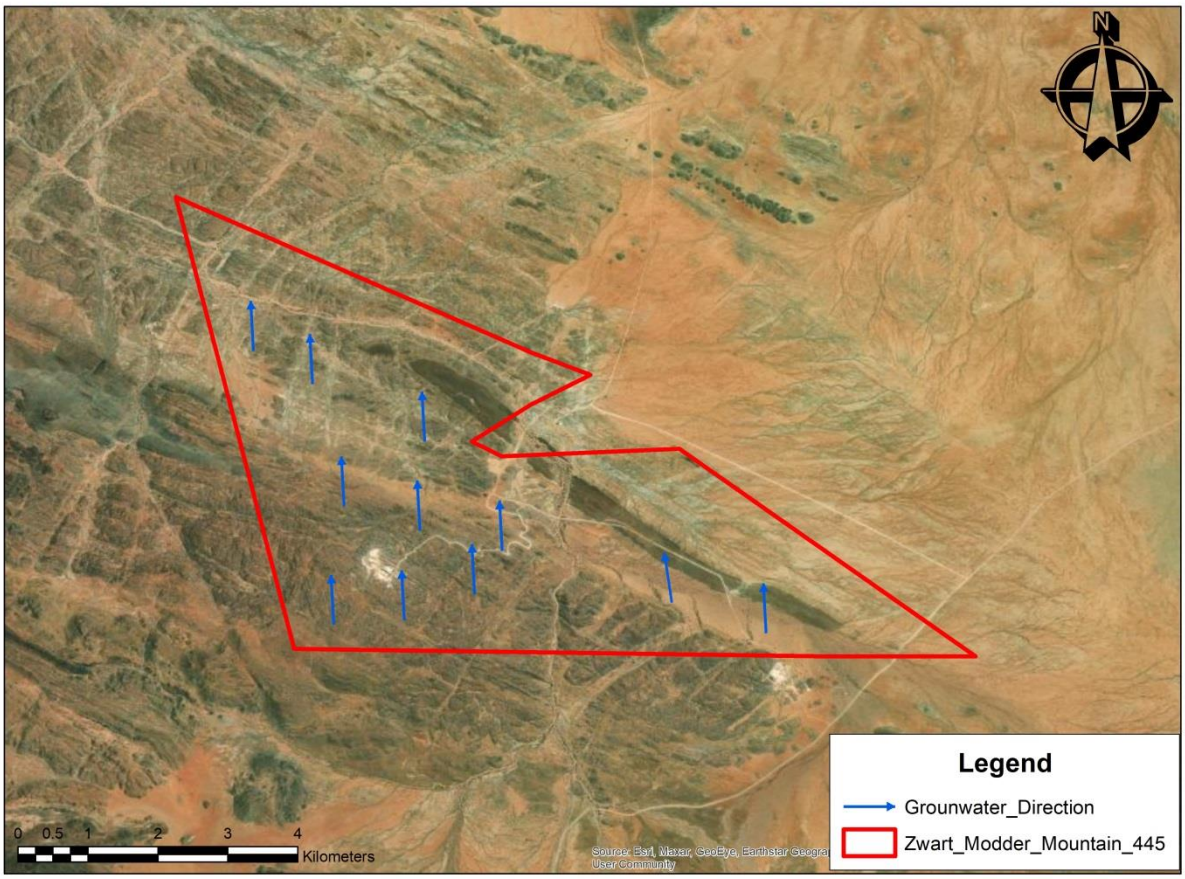


Figure 10-15: Groundwater direction.

10.7.8 Groundwater Catchment area and Recharge

The groundwater recharge area delineated is 349.79 km2. If water is abstracted from the four boreholes, they can tap water recharge in this area.

Table 10-7 provides the mean groundwater recharge on the mine area defined by the topography. The mean groundwater on the specific proposed development portion is estimated to be in the order of 0.5 mm/a or 0.5% of MAP or 479.16 m3/d as a maximum level. The groundwater recharge volume of 479 m3/d or 05.55 l/s for 12 h/d, which is large than the water demand of 22 265 m3/a or 61 m3/d. The water abstraction at a rate of 61 m3/d is therefore sustainable.

Table 10-7: Groundwater recharges figures and percentages

Summary of Recharge			**MAIN**		
Pofadder					
Method	mm/a	% of rainfall	Certain (Very High=5 ; Low=1		
CI	0.5	0.5	5		
SVF:Equal Volume			4		
SVF:Fit			4		
CRD			4		
Qualified Guesses :					
Soil	17.5	18.4	1		
Geology	5.2	5.5	1		
Vegter	0.1	0.1	5		
Acru	1	1.1	5		
Harvest Potential	1	1.1	5		
Expert's Guesses			3		
Base Flow (Minimum Re)	1	1.1	5		
2 H displacement method			1		
Carbon 14 method			1		
EARTH MODEL			1		
Groundwater Flow Model			1		
Average recharge	1.5	1.6			
Recharge=	0.5	0.5			
				=	0.174895 Mm^3/a
				=	479.16 m^3/d
Area (km^2)=	349.79			=	5.55 L/s
Annual Rainfall (mm)	95				

10.7.9 Available groundwater resources

Ten boreholes are available to be utilised on a relay basis to spread the load and to rest the boreholes for long periods. Four of the boreholes were submitted to borehole yield testing procedures. Two of the four boreholes can deliver a combined yield of 34.2 m3/d. Additionally, the six boreholes recharge of 479 m3/d in the designated catchment area can sustain the water demand for the mine project.

10.7.10 Proposed future production boreholes

It is proposed that the other boreholes, not tested yet, located in the mining area also be used to provide water to the mine. Those boreholes can be used and when needed. Groundwater recharge in the groundwater catchment area is high enough to provide water for the mine project

10.7.11 Aquifer

Based on the information collected during hydrocensus, the aquifer in the study area could be classified as a Minor Aquifer. This aquifer has small contribution to drinking water as the area received water from; however, the aquifer had a high contribution to the nearby. In order to achieve Groundwater Quality Management Index, a point scoring system as presented in Table 10-8 and 10-9 was used.

Table 10-8: Ratings for the Aquifer System Management and Second Variable Classifications

Aquifer System Management Classification		
Class	**Points**	**EIA Area**
Sole Source Aquifer System:	6	-
Major Aquifer System:	4	-
Minor Aquifer system:	2	2
Non-Aquifer System:	0	-
Special Aquifer System:	0 – 6	-
Second variable Classification Weathering/ Fracturing		
Class	**Points**	**EIA Area**
High:	3	3
Medium:	2	-
Low:	1	-
Note: The aquifer is highly weathered		

Table 10-9: Ratings for Groundwater Quality Management Classification System

Aquifer System Management Classification		
Class	**Points**	**EIA Area**
Sole Source Aquifer System:	6	-
Major Aquifer System:	4	-
Minor Aquifer system:	2	2
Non-Aquifer System:	0	-
Special Aquifer System:	0 – 6	-

Aquifer Vulnerability Classification		
Class	**Points**	**EIA Area**
High:	3	-
Medium:	2	-
Low:	1	1

Table 10-10: Level of groundwater protection based on groundwater quality management classification

GQM Index = Aquifer System management x Aquifer Vulnerability

= 2 x 1 = 2

GQM Index	Level of Protection	EIA Area
<1	Limited Low Level	-
1 – 3	Medium Level High Level	2
3 – 6	Strictly non-degradable	-
6 – 10		-
>10		-

Aquifer Susceptibility: Aquifer susceptibility, a qualitative measure of the relative ease at which a groundwater body can be potentially contaminated by anthropogenic activities and which include both aquifer vulnerability and the relative importance of the aquifer in terms of its classification, in terms of the above, is classified as Medium.

Aquifer Protection Classification: The rating for Aquifer System Management Classification and Aquifer Vulnerability Classification yields a Groundwater Quality Management Index of 2 for the proposed project site, and this indicate that Low-level groundwater protection may be required. DWS overarching water quality management principles are; (1) protection of human health and (2) protection of the environment. Based on these principle's objectives and the significance of this aquifer classification, if any potential risk exist, measures must be put in place to limit the risk to the environment.

10.8 Biodiversity

10.8.1 Biomes

The proposed mining area is located in the Nama Karoo Biome as shown in Figure 10-16. The Nama Karoo Biome is a vast, open, arid region dominated by low-shrub vegetation and abundance of rock. Although not remarkably rich in species or endemism, the flora and fauna of the region are surprisingly adapted to its climatic boundaries. The major pressure to biodiversity is posed by overgrazing farm animals, introduction of alien species of plants, mining and conversion of native habitat to agriculture. In this biome the temperatures can vary dramatically between day and night times. This biome is dominated by low growing shrubs. Reptiles and small invertebrates are common ((Nyamoki Consulting , 2021).

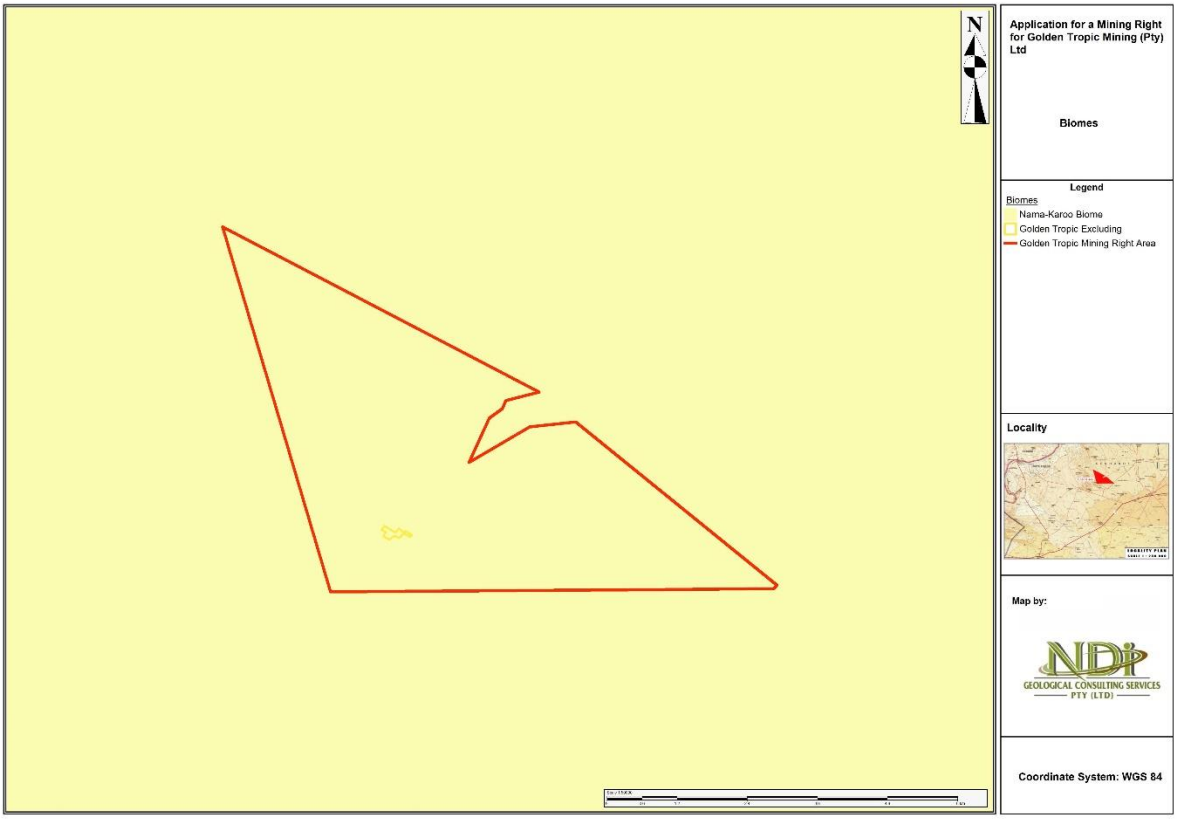


Figure 10-16: Biomes

10.8.2 Bioregions

The proposed mining area is located in the Bushmanland Bioregion (Figure 10-17). The Bushmanland Bioregion occurs from the north-eastern part of the Namaqualand area in the west to around Prieska in the east and from around Upington in the north to the Brandvlei/Sak River vicinity in the south.

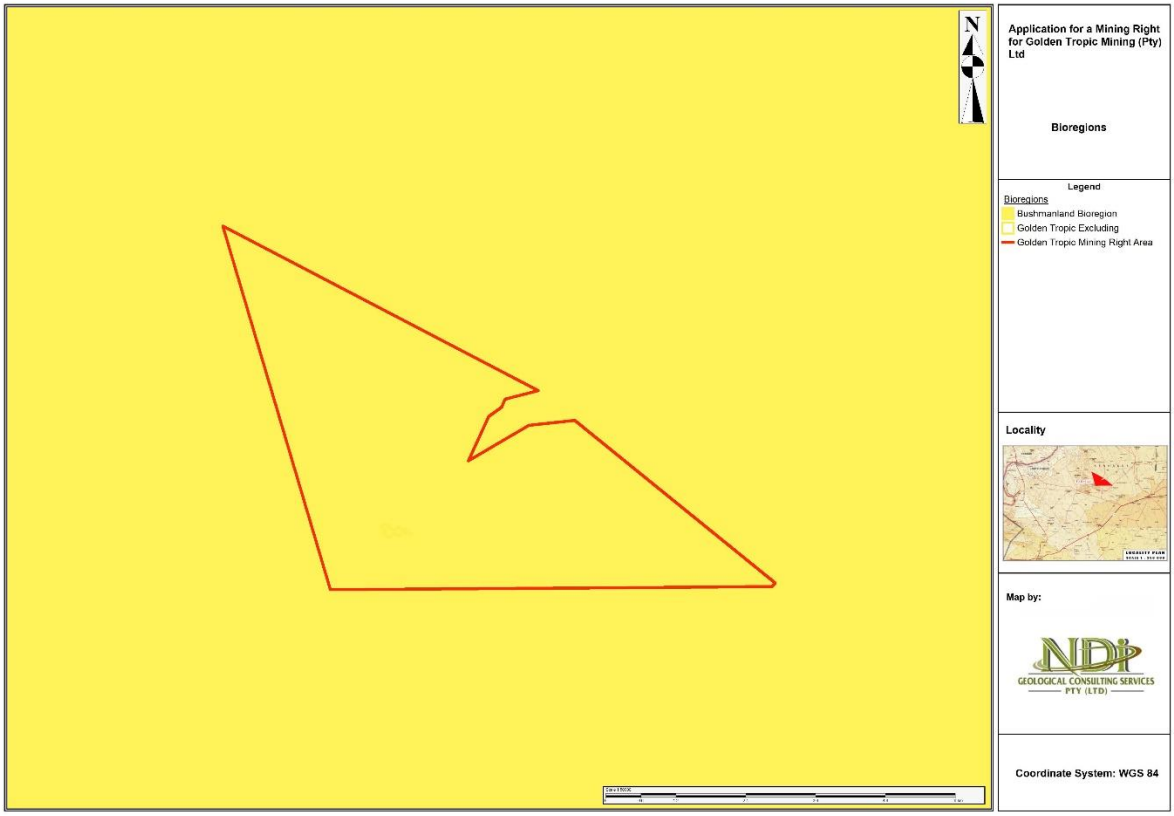


Figure 10-17: Bioregions

10.8.3 Vegetation Types

According to the SANBI remaining vegetation types database, there is no remaining natural vegetation on the affected area.

The proposed site is associated with ecosystems that are considered to be threatened (Figure 10-18). The threatened ecosystems associated with the site are the Bushmanland Arid Grassland, Blouputs Karroid Grassland and Lower Gariep Broken Veld.

- Lower Garieb Broken Veld: According to Mucina and Rutherford (2006) this vegetation type is associated with hills and low mountains, slightly irregular plains but with some rugged terrain with spare vegetation dominated by shrubs and dwarf shrubs, with annuals conspicuous, especially in spring, and perennial grasses and herbs. Groups of widely scattered low trees such as *Aloe dichotoma* var. *dichotoma* and *Acacia mellifera* subsp. *detinens* occur on slopes of koppies and on sandy soils of foot slopes respectively. This vegetation type is Least Threatened, with 4% statutorily conserved in the Augrabies Falls National Park, with only a very small part transformed.
- Blouputs Karroid Thornveld: Mucina and Rutherford (2006) describe this vegetation type as an open shrubland on slightly undulating rocky plains dominated by patchy occurrences of *Acacia mellifera* subsp. *detinens.* Prominent lower shrubs include *Phaeoptilum spinosum*, *Boscia foetida* and *Cadaba aphylla*, while the dominant grasses include *Schmidtia Kalahari-ensis* and *Stipagrostis ciliate, S. obtuse* and *S. uniplumis*. This vegetation type is Least Threatened, with about 27% statutorily conserved in the Augrabies Falls National Park, with only a very small part transformed.
- Bushmanland Arid Grassland: According to Mucina and Rutherford (2006) this vegetation is associated with extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses which gives this vegetation type the character of semi-desert ‘steppe”, with low shrubs in places, and annual herbs after good rainfalls. This vegetation type has small patches conserved in the Augrabies Falls National Park with very little of the area transformed.

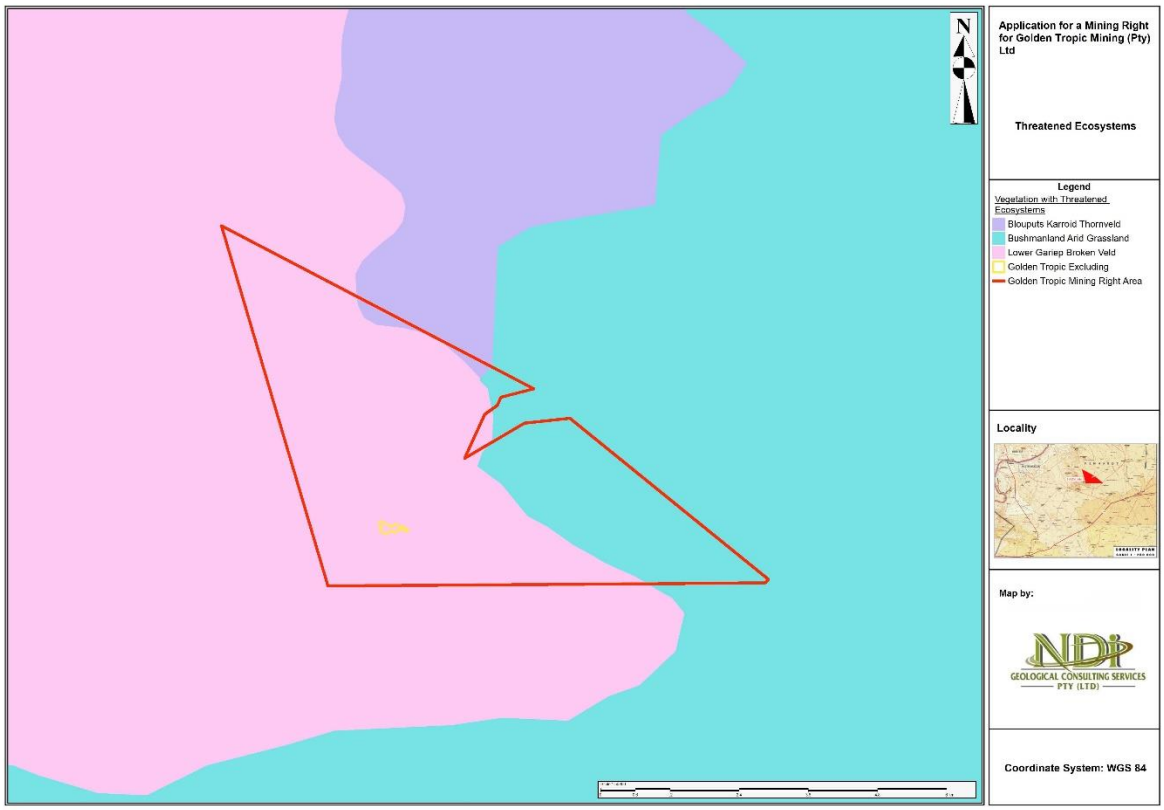


Figure 10-18: Vegetation with Threatened Ecosystems

According to SANBI, the all the ecosystems are classified as Least Threatened (Figure 10-19).

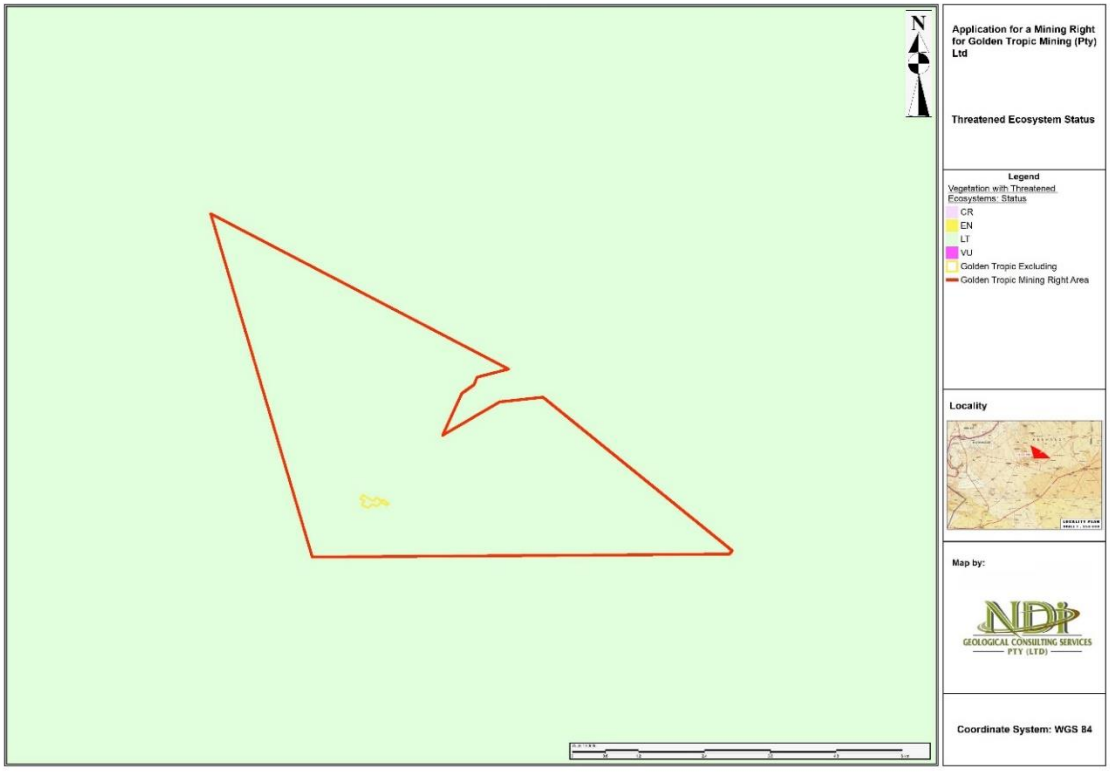


Figure 10-19: Status of Vegetation with Threatened Ecosystems

According to the biodiversity study undertaken for the area, the study site is characterised by rocky outcrops with sparse distribution of succulent species, with associated woody and herbaceous shrubs (Figure 10-20). It consists of Slopes and elevated hills and ridges. In other areas a fairly flat terrain can be observed. The site is disturbed by historic mining operations (Figure 10-21). The disturbance has created suitable conditions for the propagation of invasive alien plant species on site (Nyamoki Consulting , 2021).

Figure 10-20: Rocky outcrop dominated by evergreen shrub communities, with associated woody and herbaceous shrubs

Figure 10-21: Disturbance observed onsite.

10.8.4 Flora species of special concern

South Africa has become the first country to fully assess the status of its entire flora. Major threats to the South African flora are identified in terms of the number of plant taxa Red-Listed as threatened with extinction as a result of threats like, habitat loss (e.g. infrastructure development, urban expansion, crop cultivation and mines), invasive alien plant infestation (e.g. outcompeting indigenous plant species), habitat degradation (e.g. overgrazing, inappropriate fire management etc.), unsustainable harvesting, demographic factors, pollution, loss of pollinators or dispersers, climate change and natural disasters (e.g. such as droughts and floods). South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. However, due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. As a result, a SANBI uses an amended system of categories in order to highlight species that may be of low risk of extinction but are still of conservation concern (SANBI, 2015).

In the Northern Cape, species of conservation concern are also protected in terms of the Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12th of December 2011, and also provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the Act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. NB. Please note that all indigenous plant species are protected in terms of Schedule 3 of this act (e.g. any work within a road reserve).

The following species protected in terms of the NCNCA are known to be found in the area.

Table 10-11: the NCNCA are known to be found in the area

Species Name	Category	Recorded onsite
Aloe claviflora	Schedule 2 protected	×
Boscia albitrunca	Schedule 2 protected.	×
Boscia foetida	Schedule 2 protected.	×
Cynanchum viminale	Schedule 2 protected.	×
Euphorbia mauritanica var. lignosa	Schedule 2 protected.	×
Euphorbia spinea	Schedule 2 protected.	×
Galenia africana	Schedule 2 protected.	×

Some of the sensitive species that can occur onsite may be affected by the proposed development (such as *Euphorbia spinea* and *Galenia africana*). These species are protected within South Africa under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development.

10.8.5 Ethnobotanical plant species

Ethnobotany/ Ethnoecology are a branch of botany that focuses on the use of plants for medicines, cultural and recreational purposes. The overexploitation of indigenous plants for ethnobotanical purposes can be detrimental to populations of those particular plant species, and the other species that depend on its existence for their survival.

South Africa has a rich diversity of medicinal plants that not only have a global significance, but also have a cultural and historical role (van Wyk *et al.* 2009). There is a rapidly growing concern for conservation of medicinal plants that are dwindling in number due to illegal harvesting (Institute of Natural Resources 2003). This is particularly apparent in rural areas where medicinal plants are overexploited by traditional doctors. Aloes species were found within the study site. The bitter sap in the

leaves of *Aloe greatheadii* is used medicinally for the treatment of wounds, sores and burns while *Aloe marlothi* Leaf and root decoctions are used by the Zulus for roundworm infestations and by other cultures for stomach problems and horse sickness.

10.8.6 Fauna

The biodiversity assessment conducted for the proposed project found the following:

- Mammals: According to the desktop study conducted, forty-eight species of mammal are known to occur or likely to occur within the region (Friedmann & Daly 2004, Skinner & Chimimba 2005, Monadjem et al. 2010), and the majority of these can be expected to occur within the study area, given the habitats available and the relatively untransformed nature of much of the study area. Most of species in the region are widespread in central and eastern and/or western South Africa, while a number or confined to the drier western regions. One species is a South African endemic –Cape Horseshoe Bat Rhinolophus capensis. The species listed in Table 6 were identified as being possible to occur within the study area or the immediate vicinity of the proposed mining area. It must be noted that some of these species are very sensitive to habitat and in some instances; the likeliness for them to occur is minimal. There are nine Red List mammal species that have a HIGH chance of occurring in the study area. Springboks and baboons are common in the property.

Table 10-12: Sensitive mammals that are likely to occur onsite

Common name	Recorded on site
Black-footed Cat	None
Leopard	None
Brown Hyena	None
Angolan Hairy Bat	None
Littledales' Whistling Rat	None
Dassie Rat	None
Cape Horseshoe Bat	None
Honey Badger	None

During the field investigation, there were baboons, mountain rabbits and game animals such as Springboks that were recorded. None of the sensitive mammals which were expected were spotted on site except for droppings of smaller mammals such as hare or rabbit species. The presence of historic mining disturbance and the seasonality issues may explain why all the sensitive mammals were not seen during the site visit. Some of the expected animals are nocturnal, and thus may only be seen at night.

- Reptiles: Recorded reptile diversity is moderately rich overall, with 46 species in the area (Bates et al. 2014). Most species are fairly widespread in western South Africa, however, some are restricted to the mountains that follow the Gariep River. Rocky and mountainous areas and open plains support reptile faunas that are somewhat distinct from each other. Seven endemic or near-endemic species are present within the study area, Speckled Padloper *Homopus signatus*, Striped Pygmy Gecko *Goggia lineatus*, Good's Gecko *Pachydactylus goodi*, Sand Lizard *Pedioplanis laticeps*, Southern Karusa Lizard *Karusasaurus polyzonus,* Namaqua Dwarf Burrowing Skink *Acontias tristis*, and Spotted Rock Snake *Lamprophis guttatus*. None of the expected reptiles were observed on site during the site visit.

- Avifauna: Birds are generally regarded as good ecological indicators, because their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological conditions are directly linked to land cover. As the land cover of an area changes, so do the types of birds in that area (The Bird Community Index, 2007). Land cover is directly linked to habitats within the study area. The diversity of these habitats should give rise to many different species. According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the area; the majority of these birds are comprised of Bushveld and Mountainous species. All birds that could be present within the vicinity of the study area are listed in Table 10-14.

Table 10-13: Red Data bird species potentially found within the study site.

Scientific Name	Common Name	IUCN Status
Geronticus calvus	Southern Bald Ibis	VU
Sagittarius serpentarius	Secretary bird	NT
Gyps coprotheres	Cape Vulture	VU
Stephanoaetus coronatus	African Crowned Eagle	NT
Circus ranivorus	African Marsh-Harrier	VU
Circus maurus	Black Harrier	NT
Falco biarmicus	Lanner Falcon	LC
Alcedo semitorquata	Half Collared Kingfisher	CR
Bugeranus carunculatus	Wattled Crane	VU
Anthropoides paradiseus	Blue Crane	VU
Balearica regulorum	Grey Crowned Crane	VU
Eupodotis senegalensis	White-bellied Korhaan	VU

A few avifaunal species were spotted onsite during the site visit. The proposed mining operation may generate noise pollution which serves as a deterrent to birds.

- Invertebrates: Butterflies are a good indication of the habitats available in a specific region (Woodhall 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope or endemic species (specific habitat requirements with populations concentrated in a small area) which may be very specialised (Woodhall 2005). Butterflies are useful indicators as they are relatively easy to locate and catch, and therefore identify. No butterflies were observed during the site visit. The site has an abundance of locust species.

10.9 Conservation Plan

According to the Northern Cape Provincial Biodiversity Conservation Plan (C Plan), a portion of the affected property is classified as a Critical Biodiversity Area (CBA (areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan) (Figure 10-22).

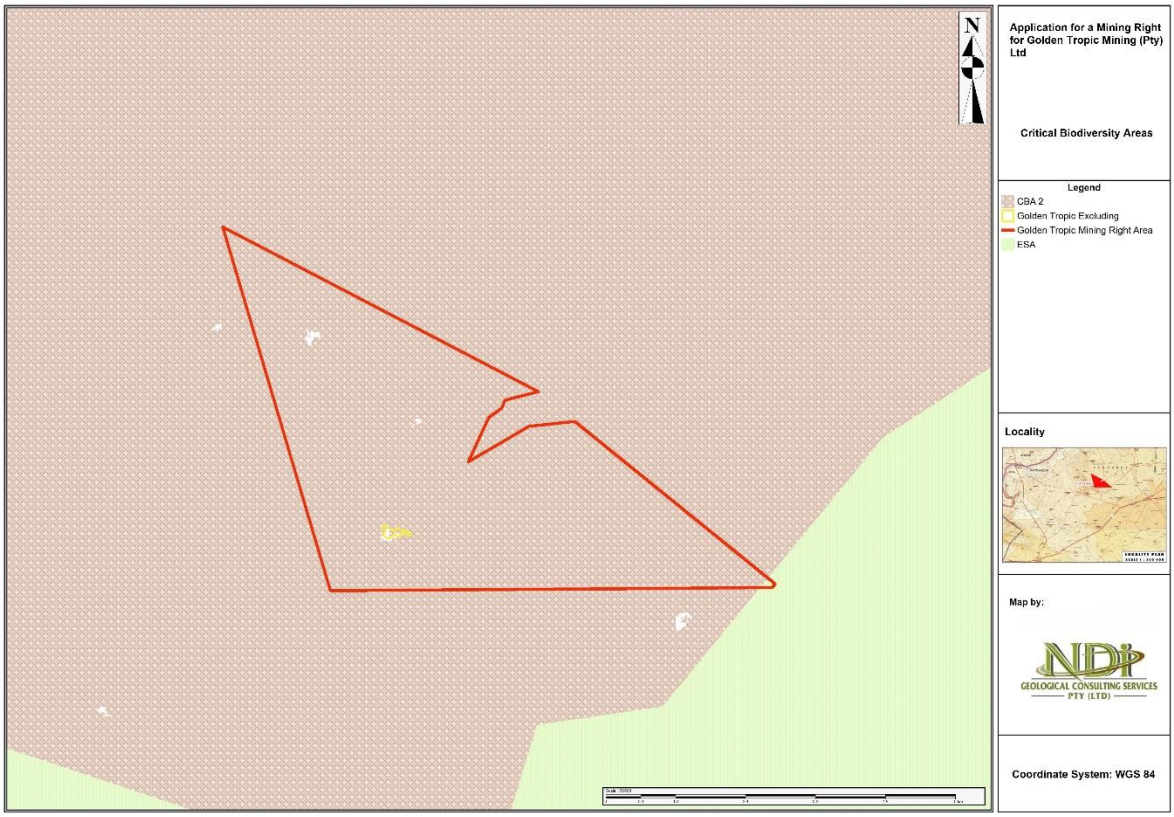


Figure 10-22: Northern Cape C Plan Areas of Conservation Importance

The Namakwa District Municipality CPlan shows that a portion of the affected area is classified as an Ecological Support Area (ESA). Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas (CBAs) and/or in delivering ecosystem services.

Figure 10-23 provides a map showing areas of conservation importance that may be affected by the mining activities.

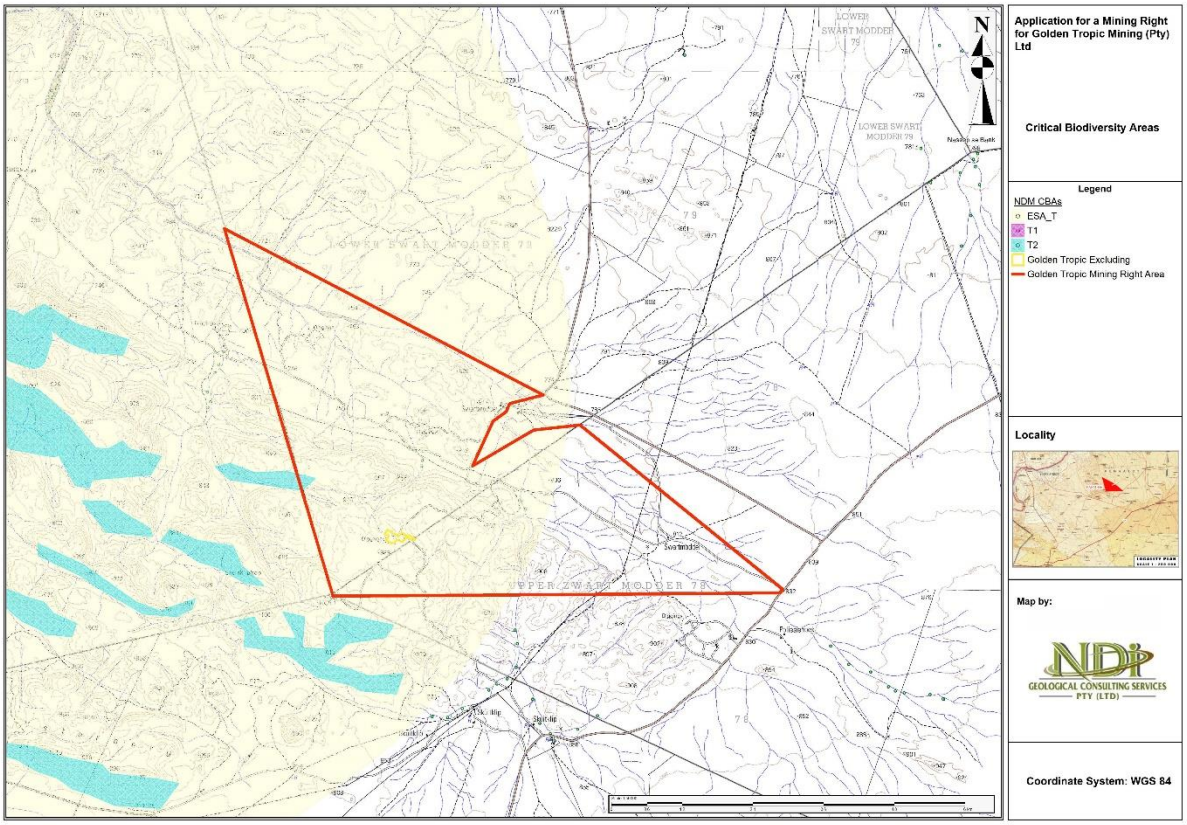


Figure 10-23: NDM C Plan Areas of Conservation Importance

10.10 Heritage and Palaeontological Resources

The site-specific Heritage Impact Assessment (HIA) conducted in the area found that:

- Archaeological and Heritage Sites: The study area did not attract prehistoric settlement (Morris 2010, Orton & Webly (2013) and the specialist was of the opinion that the site is not likely to yield any significant archaeological findings. Based on the field study results and field observations, it is the considered opinion of the author that the receiving environment for the proposed mining is medium to high potential to yield previously unidentified archaeological sites during mining work (Integrated Specialist Services (Pty) Ltd, 2021).
- Buildings and Structures older than 60 years: The study did not record any buildings and structures within the proposed Mining Right area; therefore, the project does not necessarily trigger Section 34 of the NHRA.
- Burial grounds and graves: The study did not identify any graves or burial sites within the proposed Mining Right site however, the possibility of encountering previously unidentified burial sites is low within the proposed mining site, should such sites be identified during mining, they are still protected by applicable legislations, and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.
- Significance valuation for Burial Ground, Historic Cemeteries, and Individual Graves: The significance of burial grounds and gravesites is closely tied to their age and historical, cultural,

and social context. Nonetheless, every burial should be considered as of high socio-cultural significance protected by practices, a series of legislations, and municipal ordinances.

- Public Monuments and Memorials: The survey did not identify any historical monument and public memorials within the proposed Mining Right Application site. There are no monuments or plaques within the proposed mining site that are on the National Heritage or provincial List. The proposed mining will not impact on any listed monuments and memorials in the project area.
- Battle fields: According to Orton &Webley (2013) there was fight between the Korana and the Border Police at Swart Modder which resulted in one commando being killed. The grave was identified and mapped see (Morris, 2010 &Orton & Webley 2013). However, the grave falls outside the Mining Right Area. No reference was made to the Korana casualty and this study scanned the study area for any potential graves not mentioned by previous reports. The exact position of the battle was not mapped.
- Archaeo-Metallurgy, Prehistoric Mining and Mining Heritage: There are historical and current mining activities in the entire Northern Cape Province, however none are located on the proposed mining site.
- Palaeontology: It is well known that fossil resources are absent from granitic rocks, and this is expected to be the case here. Almond and Pether (2008) note the Namaqua-Natal Metamorphic rocks to have no palaeontological significance, since no fossils have yet been recorded in them. However, water-laid deposits around the granite outcrops can include relatively recent fossils.

10.11 Noise

The MRA area is located in a rural area and the typical noise rating in the area is expected to be that for rural districts / suburban districts with little road traffic. According to SANS 10103:2008, the continuous noise rating level is thus likely between 35 dB(A) at night to 45 /50 dB(A) during the day.

10.12 Socio-Economic

The proposed mining project will be located within the Kai !Garib Local Municipality which is situated in the ZF Mgcawu District Municipality. With 284 375 people, the ZF Mgcawu District Municipality housed 0.5% of South Africa's total population in 2019. Between 2008 and 2018 the population growth averaged 1.53% per annum which is similar than the growth rate of South Africa as a whole (1.57%). Compared to Northern Cape's average annual growth rate (1.66%), the growth rate in ZF Mgcawu' s population at 1.51% was very similar than that of the province.

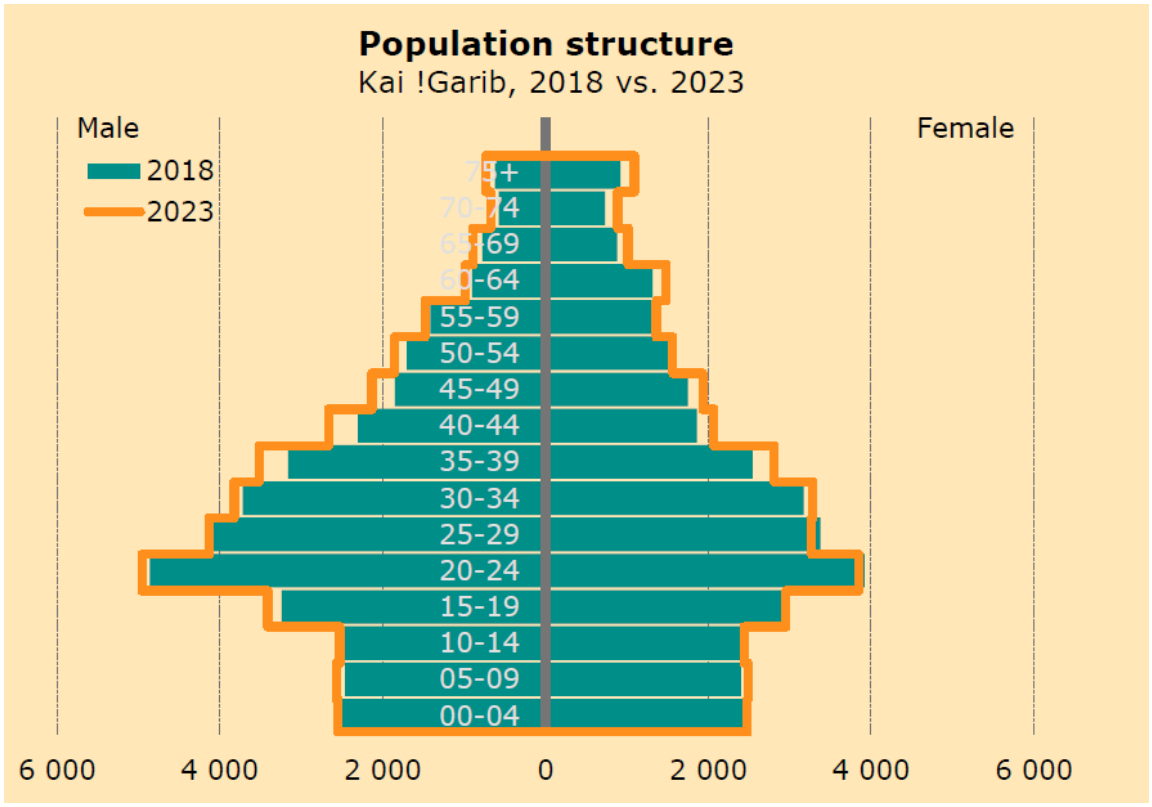
10.12.1 Population

With 70 500 people (36 800 males and 33 700 females), the Kai !Garib Local Municipality housed 0.1% of South Africa's total population in 2018. Between 2008 and 2018 the population growth averaged 0.87% per annum which is about half than the growth rate of South Africa as a whole (1.57%). Compared to ZF Mgcawu's average annual growth rate (1.53%), the growth rate in Kai !Garib's population at 0.87% was about half than that of the district municipality (Kai !Garib LM, 2020/2021).

Based on the present age-gender structure and the present fertility, mortality and migration rates, Kai !Garib's population is projected to grow at an average annual rate of 0.9% from 70 500 in 2018 to 73 900 in 2023.

The population projection of Kai !Garib Local Municipality shows an estimated average annual growth rate of 0.9% between 2018 and 2023. The average annual growth rate in the population over the

projection period for ZF Mgcawu District Municipality, Northern Cape Province and South Africa is 1.2%, 1.3% and 1.3% respectively. The Northern Cape Province is estimated to have an average growth rate of 1.3% which is very similar than that of the Kai !Garib Local Municipality. The South Africa as a whole is estimated to have an average annual growth rate of 1.3% which is very similar than that of Kai !Garib's projected growth rate (Kai !Garib LM, 2020/2021).



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POPULATION PYRAMID

Figure 10-24: Population Pyramid - Kai !Garib Local Municipality, 2018 Vs. 2023 [Percentage]

The population pyramid reflects a projected change in the structure of the population from 2018 and 2023. The differences can be explained as follows:

- In 2018, there is a significantly larger share of young working age people between 20 and 34 (32.8%), compared to what is estimated in 2023 (31.6%). This age category of young working age population will decrease over time.
- The fertility rate in 2023 is estimated to be slightly higher compared to that experienced in 2018.
- The share of children between the ages of 0 to 14 years is projected to be slightly smaller (20.4%) in 2023 when compared to 2018 (21.3%).

In 2018, the female population for the 20 to 34 years age group amounts to 14.9% of the total female population while the male population group for the same age amounts to 18.0% of the total male population. In 2023, the male working age population at 17.5% still exceeds that of the female population working age population at 14.1%, although both are at a lower level compared to 2018.

10.12.2 Level of Education

The number of people without any schooling decreased from 2008 to 2018 with an average annual rate of -3.17%, while the number of people within the 'matric only' category, increased from 6 420 to 8 920. The number of people with 'matric and a certificate/diploma' increased with an average annual rate of 1.35%, with the number of people with a 'matric and a Bachelor's' degree increasing with an average annual rate of 0.07%. Overall improvement in the level of education is visible with an increase in the number of people with 'matric' or higher education.

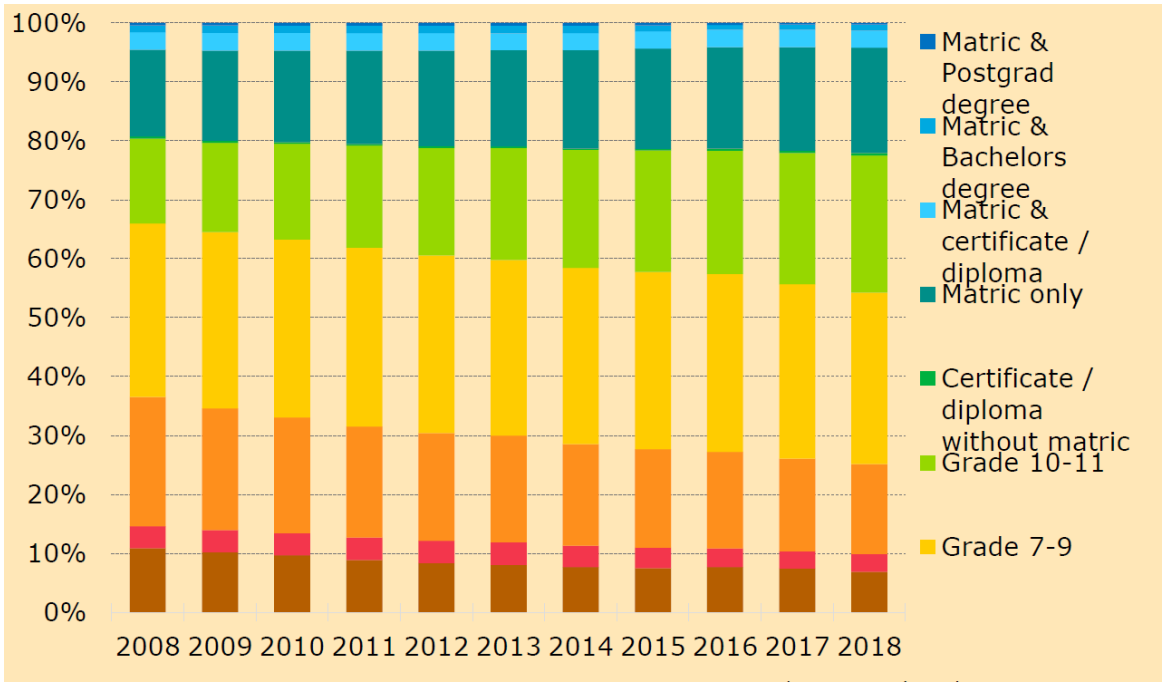


Figure 10-25: Highest Level of Education: Age 15+ - Kai !Garib Local Municipality, 2008-2018 [Percentage]

The number of people without any schooling in Kai !Garib Local Municipality accounts for 29.53% of the number of people without schooling in the district municipality, 5.26% of the province and 0.15% of the national. In 2018, the number of people in Kai !Garib Local Municipality with a matric only was 8,920 which is a share of 20.33% of the district municipality's total number of people that has obtained a matric. The number of people with a matric and a Postgrad degree constitutes 15.53% of the district municipality, 2.59% of the province and 0.03% of the national.

A total of 42 800 individuals in Kai !Garib Local Municipality were considered functionally literate in 2018, while 13 400 people were considered to be illiterate. Expressed as a rate, this amounts to 76.11% of the population, which is an increase of 0.1 percentage points since 2008 (66.12%). The number of illiterate individuals decreased on average by -2.27% annually from 2008 to 2018, with the number of functional literate people increasing at 2.63% annually.

Kai !Garib Local Municipality's functional literacy rate of 76.11% in 2018 is lower than that of ZF Mgcawu at 79.67% and is lower than the province rate of 78.61%. When comparing to National Total as whole, which has a functional literacy rate of 84.42%, it can be seen that the functional literacy rate is higher than that of the Kai !Garib Local Municipality.

10.12.3 Employment Levels

The working age population in Kai !Garib in 2018 was 51 000, increasing at an average annual rate of 1.21% since 2008. Out of the economically active population, there are 4 170 that are unemployed, or when expressed as a percentage, an unemployment rate of 12.0%. In 2008, 50.0% of the total population in Kai !Garib Local Municipality were classified as economically active which decreased to 49.2% in 2018. Compared to the other regions in ZF Mgcawu District Municipality, Kai !Garib Local Municipality had the highest EAP as a percentage of the total population within its own region relative to the other regions.

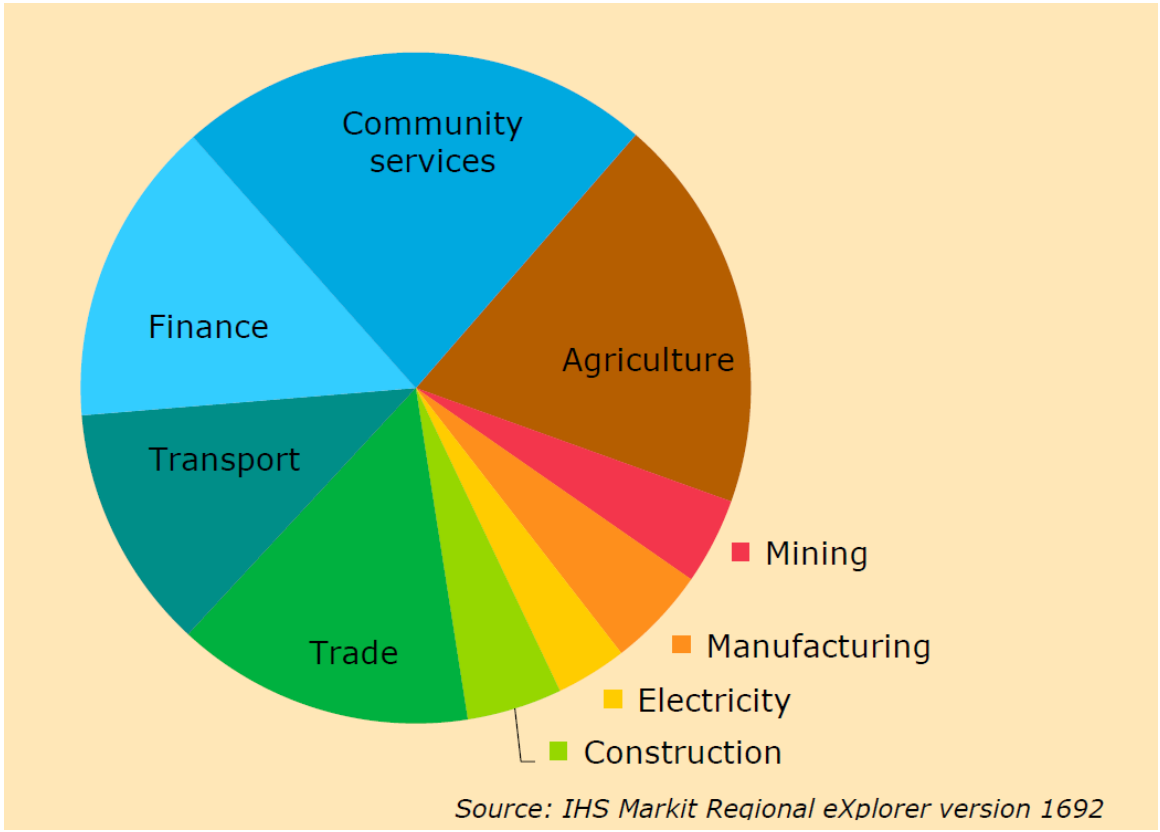
The unemployment rate is an efficient indicator that measures the success rate of the labour force relative to employment. In 2008, the unemployment rate for Kai !Garib was 11.2% and increased overtime to 12.0% in 2018. The gap between the labour force participation rate and the unemployment rate increased which indicates a positive outlook for the employment within Kai !Garib Local Municipality.

10.12.4 Economic Statistics

With a GDP of R 5.62 billion in 2018 (up from R 3.05 billion in 2008), the Kai !Garib Local Municipality contributed 22.80% to the ZF Mgcawu District Municipality GDP of R 24.6 billion in 2018 increasing in the share of the ZF Mgcawu from 23.60% in 2008. The Kai !Garib Local Municipality contributes 5.72% to the GDP of Northern Cape Province and 0.12% the GDP of South Africa which had a total GDP of R 4.87 trillion in 2018 (as measured in nominal or current prices). It's contribution to the national economy stayed similar in importance from 2008 when it contributed 0.13% to South Africa, but it is lower than the peak of 0.13% in 2008. It is expected that Kai !Garib Local Municipality will grow at an average annual rate of 0.09% from 2018 to 2023.

In 2018, the community services sector is the largest within Kai !Garib Local Municipality accounting for R 1.14 billion or 22.9% of the total GVA in the local municipality's economy. The sector that contributes the second most to the GVA of the Kai !Garib Local Municipality is the agriculture sector at 19.1%, followed by the finance sector with 14.7%. The sector that contributes the least to the economy of Kai !Garib Local Municipality is the electricity sector with a contribution of R 170 million or 3.43% of the total GVA.

The economic sectors that recorded the largest number of employment in 2018 were the agriculture sector with a total of 12 400 employed people or 44.6% of total employment in the local municipality. The community services sector with a total of 5 960 (21.4%) employs the second highest number of people relative to the rest of the sectors.



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GVA BY BROAD ECONOMIC SECTOR

Figure 10-26: Gross Value Added (GVA) by broad economic sector Kai !Garib Local Municipality, 2018

10.13 Description of the current land uses.

The majority of the affected area is currently being used for agriculture and mining.

11 Impacts and Risks Identified

Table 11-1 provides a high-level assessment of the potential impacts and associated mitigation measures which could result from the proposed mining project during construction, operation and decommissioning/closure. These impacts will be further refined and assessed according to the impact assessment methodology in Section 14.

Table 11-1: Summary of Potential Environmental Impacts Associated with the Proposed Development

Element of Environment	Potential Impact Descriptions
Socio-Economic	Possible job opportunities during the construction and operation.
Hydrogeology	Possible groundwater contamination.
Surface water	Possible surface water contamination.
Aquatic ecosystems and riparian areas	Possible impacts on aquatic ecosystems and riparian areas
Air Quality	Possible impact on Air Quality in the area.
Climate Change	Possible contribution to climate change through emission of Green House Gases
Vibrations	Possible impacts on private properties and fauna due to vibrations
Noise	Possible generation of noise during construction and operation.
Soils/Land Use/Land Capability	Loss of soil resource and change in land capability and land use.
Biodiversity	Disturbance and loss of biodiversity, especially SCC.
Aquatic ecology	Possible loss, sedimentation and contamination of aquatic resources
Heritage	Possible impact on heritage and cultural resources (including graves) in the area.
Traffic	Potential safety issues due to the increased traffic.
Cumulative Impacts	Cumulative Impacts

These impacts have been further refined and assessed according to the quantitative impact assessment methodology in Section 12 and the results are presented in Section 13.

12 Methodology used in determining the significance of environmental impacts

The following methodology for determining the significance of environmental impacts will be utilised for the EIA/EMPr phase.

The impact assessment methodology has been formalised to comply with Regulation 31(2) (i) of NEMA, which states the following:

> *(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision …, and must include –*
> *(l) an assessment of each identified potentially significant impact, including –*
> *(i)* ***cumulative impacts****;*
> *(ii) the* ***nature*** *of the impact;*
> *(iii) the* ***extent*** *and* ***duration*** *of the impact;*
> *(iv) the* ***probability*** *of the impact occurring;*
> *(v) the* ***degree*** *to which the impact can be* ***reversed****;*
> *(vi) the* ***degree*** *to which the impact may* ***cause irreplaceable loss of resources****; and*
> *(vii) the* ***degree*** *to which the impact can be* ***mitigated****.*

All the identified potential impact will be assessed according to the following Impact Assessment Methodology as described below. This methodology has been utilised for the assessment of environmental impacts where the consequence (severity of impact, spatial scope of impact and duration of impact) and likelihood (frequency of activity and frequency of impact) have been considered in parallel to provide an impact rating and hence an interpretation in terms of the level of environmental management required for each impact.

The first stage of any impact assessment is the identification of potential environmental activities[1], aspects[2] and impacts which may occur during the commencement and implementation of a project. This is supported by the identification of receptors[3] and resources[4], which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. Environmental impacts5 (social and biophysical) are then identified based on the potential interaction between the aspects and the receptors/resources.

The significance of the impact is then assessed by rating each variable numerically according to defined criteria as outlined in Table 12-1. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity[6], spatial scope[7] and duration[8] of

[1]An ***activity*** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation.

[2]An ***environmental aspect*** is an 'element of an organisations activities, products and services which can interact with the environment'. The interaction of an aspect with the environment may result in an impact.

[3]***Receptors*** comprise but are not limited to people or man-made structures.

[4]***Resources*** include components of the biophysical environment.

[5]***Environmental impacts*** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as aquifers, flora and palaeontology. In the case where the impact is on human health or well-being, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.

[6]***Severity*** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

[7]***Spatial scope*** refers to the geographical scale of the impact.

[8]***Duration*** refers to the length of time over which the stressor will cause a change in the resource or receptor.

the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity9 and the frequency of the impact10 together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance rating matrix table as shown in Table 12-1. This matrix thus provides a rating on a scale of 1 to 150 (low, medium low, medium high or high) based on the consequence and likelihood of an environmental impact occurring.

Natural and existing mitigation measures, including built-in engineering designs, are included in the pre-mitigation assessment of significance. Measures such as demolishing of infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

Table 12-1: Criteria for Assessing Significance of Impacts

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5

SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
MRA specific (within the MRA boundary)	2
Local area (within 5 km of the PRA boundary)	3
Regional	4
National	5

DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

CONSEQUENCE

FREQUENCY OF ACTIVITY / DURATION OF ASPECT	RATING
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5

FREQUENCY OF IMPACT	RATING
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

LIKELIHOOD

[9] ***Frequency of activity*** refers to how often the proposed activity will take place.

[10] ***Frequency of impact*** refers to the frequency with which a stressor (aspect) will impact on the receptor.

Consequence

Likelihood														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
10	20	30	40	50	60	70	80	90	100	110	120	1	140	150

	High	76 to 150	Improve current management
	Medium High	40 to 75	Maintain current management
	Medium Low	26 to 39	
	Low	1 to 25	No management required

SIGNIFICANCE = CONSEQUENCE x LIKELIHOOD

13 The positive and negative impacts that the proposed activity and alternatives will have

This section contains the assessment of potentially positive and negative environmental impacts that can be caused by the proposed project. The impacts are linked to the activities conducted for the proposed development, broadly relating to pre-construction, construction, operations and decommissioning phases. Specific emphasis was placed on any relevant environmental, social and economic impacts identified by the specialist studies, comments received during the stakeholder engagement process, issues highlighted by relevant authorities; as well as a professional judgement of the EAP team through appraisals on the project description, listed activities and the receiving environment.

The objectives for each of the potential environmental impacts identified was to determine their significance and to promote mitigation measures to reduce the impacts to an acceptable level where required. Key potential positive and negative environmental issues relating to the proposed project were assessed according to the adopted methodology for assessing impacts as described in Section 12.

13.1 Pre-construction and Construction Phases

The pre-construction and construction phase of the project will entail the site establishment for the access roads, transportation of materials to and from the site, the camp site as well as surveying and pegging infrastructure sites. Environmental impacts on the biophysical and socio-economic environment which are anticipated to occur throughout the preconstruction and construction phases were identified as follows:

13.1.1 Socio-Economic

The following socio – economic impacts are envisaged as a result of the pre-construction and construction phases of the proposed project:

- Positive impact on the possible job opportunities. The pre-construction of proposed project will create employment opportunities as contractors will be appointed for the construction activities; and
- Positive impacts on the local economy due to economic opportunities for local and regional business.

The assessment of the current economic state in the Kai !Garib Local Municipality and ZF Mgcawu DM, and the project shows that the proposed mining activity will create numerous positive impacts and will likely stimulate the local economy.

The construction phase of the proposed mine will involve activities such as site and infrastructure development, construction of buildings and facilities, installation of machinery and equipment, civil engineering works, and other business activities related to the construction of the mine.

The cumulative economic impact arising from the initial investment will be felt throughout the economy with windfall effects benefitting related sectors in the economy. The effect is allocated according to direct, indirect and induced impacts, together forming the “multiplier effect”. The initial investment will give rise to a production effect where manufacturers and suppliers of goods and services would experience the need to expand current production levels by ramping up employee numbers and operations.

Negative social and economic impacts that are expected to occur as a result of the proposed project include:

- Generation of dust potentially resulting in a health and nuisance impact;
- Impact on safety and security as a result of theft, the occurrence of additional trucks on the roads, uncontrolled lighting of fires on site, littering and driving irresponsibly;
- Health and safety risk as a result of the movement of construction vehicles increasing the risk of accidents;
- Clearing of land which may potentially impact on the sense of place;
- Negative impact associated with construction activities, including the clearing of land will impact on the sense of place;
- Potential increase in social pathologies and negative health impacts due to potential squatting of job seekers; and
- The immediate project area is predominantly agricultural, game farming and tourism, therefore the pre-construction and construction activities have potential to impact on the economic activities of surrounding areas. There is a risk that the surrounding game farmers might lose income due to the following:
    - The reduction in guests (ecotourists and hunters) due to the change in the natural scenic environment as well as the noise and dust coming from the mine.
    - Reduction in wildlife (and livestock in some cases) due to increased criminal activity (poaching) resulting from the increased movement of people into the area.
    - Possible loss of wildlife due groundwater contamination resulting from mining activities.

13.1.2 Groundwater

The use of earth moving machinery and construction vehicles on site poses the risk of chemical spillages including fuel and oils, which may leach into the groundwater. The removal of vegetation could furthermore lower the evapotranspiration rates, thereby allowing a greater volume of potentially contaminated water to percolate to the underlying aquifer in the event of an accidental spill from the machinery. It must however be noted that the removal of vegetation will be limited to the required footprints for the access roads, the boreholes and sumps as well as the camp sites. The impact on evapotranspiration is therefore expected to be negligible.

Site clearing and grubbing is unlikely to materially affect the groundwater within the project area. However, care should be taken during the utilisation and storage of hydrocarbons and chemicals, which may have an impact on groundwater quality as a result of spillages and uncontrolled release.

13.1.3 Surface water

The potential impacts on surface water during the construction phase of the proposed project are as follows:

- Accidental spillages of hazardous substances from construction vehicles used during construction of the crossings, as well as from hazardous storage areas;
- Contamination of runoff by poor materials/waste handling practices;
- Debris from poor handling of materials and/or waste blocking watercourses;

- Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality;
- Increase in turbidity of the local water streams as a result of runoff of cleared areas; and
- Increase of surface runoff and potentially contaminated water that needs to be controlled in the areas where site clearing occurred.

According to the surface water study, it is inevitable that certain existing non perennial water courses that collect and convey surface water runoff to Samoep River would be removed or altered. Some level of sedimentation is expected to occur in the drainage lines that traverse the project area as runoff is naturally anticipated to pick up environmental debris as it crosses natural areas. Increased turbidity is reversible and surface water should return to pre-impact turbidity levels once sediment levels entering the watercourse are reduced. Settled sediments should naturally move downstream during periods of high flow flowing storm events.

Dirty rain falling on subsidiary infrastructure would be captured and contained. Consequently, the quantum of surface water runoff would reduce.

Table 13-1: Comparison between Recurrence Interval and Exceedance Probability

Recurrence Interval (RI)	Probability of Exceedance (PE)
2	50%
5	20%
10	10%
20	5%
50	2%
100	1%
200	0.5%

The small PE events typically cause flood damage, whilst the large PE storms do not. For the purpose of this impact assessment, these contradictory outcomes will be considered separately. This section shall consider the reduction in small PE floods, whilst the subsequent section will consider the impact of the reduction in Mean Annual Runoff.

In summary, the reduction in small PE (i.e. large RI) floods is viewed as a positive impact as the risk of damage to downstream communities, property, operations or infrastructure would be reduced.

However, the concomitant reduction in MAR is considered a negative impact. The reason for this apparent contradiction is that smaller storm events have a natural, restorative function in the local ecosystem. Conversely, large storm events, while part of the natural cycle, can be destructive. The impact of large storms is presented in the preceding section.

The calculated reduction in MAR in quaternary catchment MAR is 3%, which is considered negligible. Whilst this reduction could be seen as acceptable in the short term, the long-term effect may be significant. The combined significance of this impact is therefore considered to be moderate during the construction, operation and decommissioning phases of the project.

13.1.4 Heritage and Archaeological Resources

Although no heritage resources were recorded during the HIA, the specialist noted that there remains a chance of chance finds and unmarked graves that may have been missed during the assessment. As such, there is potential for the construction activities to result in the following heritage/archaeological impacts:

- The proposed project has the potential to impact on local graves within the area; and
- The proposed project has the potential to impact on sites of archaeological importance.

13.1.5 Palaeontology Impacts

According to the specialist studies, fossil resources are known to be absent from granitic rocks, which is the case with the project area. However, water-laid deposits around the granite outcrops can include relatively recent fossils. Therefore, there remains a chance that during the pre-construction and construction phases, the proposed project may result in sealing-in or destruction of the fossils during earth moving activities.

13.1.6 Biodiversity

The property still has areas that have vegetation regarded as intact and to some degree species diverse. In addition to this, the area falls within the poorly conserved and studied Ecological Support Area (ESA 2), with endemic plant species present. As a result of this, the impacts of the proposed mining operation and associated aspects and features, although limited in extent are regarded as highly significant. Due to disturbance of the soil and removal of vegetation, it is likely that alien plants may establish on site.

Some of the sensitive species that can occur onsite may be affected by the proposed development (such as *Euphorbia spinea* and *Galenia africana*). These species are protected within South Africa under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development.

Alien plants often reduce the diversity of an area due to their invasive habit. Invasive plants grow prolifically and out-compete native species. Loss of vegetation will be irreversible and although rehabilitation can be aimed at reinstating the land to some form of land-use, restoration of the natural habitat on site cannot be achieved. This is particularly significant in an area where some plant species remain un-described. Many species in this habitat are adapted to specific soil composition and structure and the natural species composition cannot be restored after disturbance to the soil (Victor et al. 2005). The impacts attributed with the loss of habitat are listed below in the phase they occur.

The proposed project may result in the following potential impacts on the faunal environment during the construction phase:

- Loss of faunal habitat and ecological structure as a result of site clearing, alien invasive species, erosion, and general construction activities;
- Loss of faunal species due to collisions with construction vehicles and machinery;
- Loss of faunal diversity and ecological integrity as a result of construction activities, erosion, poaching and faunal specie trapping;
- Impact on faunal SCC due to habitat loss and collision with construction vehicles;
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts on faunal habitat during the operation phase.

13.1.7 Geology

It is anticipated that the removal of soils as a result of construction activities will have an impact on geology.

13.1.8 Air Quality

Dust generating activities associated with the construction and operational phase activities include:

- Materials handling;
- Vehicle entrainment of dust on the haul roads;
- Windblown dust from stockpiles;
- Vehicle emissions; and
- Blasting activities.

The impact the proposed project is envisaged to have on the air quality of the area during the construction phase are as follows:

- Possible increase in dust generation, PM_{10} and $PM_{2.5}$ as a result of bulk earthworks, operation of heavy machinery, and material movement; and
- Increase in carbon emissions and ambient air pollutants (NO_2 and SO_2) as a result of movement of vehicles and operation of machinery/equipment.

13.1.9 Climate Change

The movement of vehicles and earth moving machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area

13.1.10 Visual

The following impacts on the visual character as a result of the proposed project are envisaged during the construction phase:

- Scaring of the landscape as a result of the clearance of vegetation;
- Visual intrusion as a result of the movement of machinery and the erection of contractor camps; and
- Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.

13.1.11 Ambient Noise

The use of vehicles and machinery may result in an increase in ambient noise in the immediate vicinity of the project.

13.1.12 Soil Landuse and Land Capability

During the construction phase, all infrastructure and activities required for the operational phase will be established. The main envisaged activities include the following:

- Movement of construction vehicles, machinery and workers in unprotected areas (bare) may result in compacting of the soil of the existing roads. Fuel and oil spills from vehicles may result in soil chemical pollution;
- Clearing of vegetation will result in the soils being particularly more vulnerable to soil erosion. The impact can persist long after cessation of mining activities depending on mitigation and rehabilitation strategies. Strategic stormwater management should be put in place to minimise soil losses.
- Soil contamination as a result of construction activities can be as a result of a number of activities (i.e. incorrect hazardous substance storage, incidental hydrocarbon leakages from construction vehicles);

- Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint. Although soils will be stripped and stockpiled, loss of seed reserve and organic matter depletion through decomposition during stockpiling will severely reduce soil quality and its ecological function if not managed appropriately. Re-vegetation should be imposed as far as is possible to maintain soil fertility through natural nutrient cycling during soil storage prior to rehabilitation phase;
- The land capability will be reduced as a result of a decreased nutrient status through de-nitrification and leaching due to stripping and stockpiling footprint areas.
- Other activities in this phase that will impact on soil are the handling and storage of building materials and different kinds of waste. This will have the potential to result in soil pollution when not managed properly; and
- In areas of permanent changes such as the borehole and sump area, access roads (tracks), the erection of infrastructure and stockpiles, the current land capability and land use will be lost permanently. This will however be localised to the footprint of the infrastructure.

13.1.13 Traffic

The movement of construction vehicles in the project area will result in an increase in traffic on the roads.

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The above-mentioned impacts were assessed based on the quantitative impact assessment methodology described in Section 12 of this Report. For each impact assessed, mitigation measures have been proposed to reduce or avoid negative impacts and enhance positive impacts. These mitigations were also incorporated in the EMPr to ensure that they are implemented during the various phases of the proposed project.

The summary of the impact assessment during the construction phase is provided in Table 13-2.

Table 13-2: Impact Assessment Table for the Construction Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
Social	Influx of job seekers will have a negative social impact on the landowners and land occupiers.	2	2	3	2	2	28	Medium Low (-)	• Random and regular alcohol and drug testing shall be conducted on all personnel responsible for operating machinery and driving construction vehicles to ensure the safety of the public; • Security and safety should be emphasised; • Recruitment will not be undertaken on site; • Recruitment practises will favour locals, but farm labourers will not be employed unless agreed to with the farm owners; • Liaise with the SAPD and existing forums in order to implement effective crime prevention strategies; and • No construction workers shall be allowed to access private properties without the owner's knowledge and consent.	1	1	1	1	2	9	Low (-)
	Unauthorised access to private property outside of the demarcated areas will result in conflict with landowners.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Increased traffic in the area will increase the likelihood of accidents on the roads, posing a health and safety issue for the landowners and land occupiers.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	The influx of job seekers in the area may result in an increase in petty crimes.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Ineffective communication channels leading to community unrest.	2	2	3	2	2	28	Medium Low (-)		1	1	1	1	2	9	Low (-)
	Negative impact as a result of the dissection of land by clearing and excavations for construction of infrastructure, constraints to access to cultivated land to farmers, impacting on day-to-day farm activity.	3	1	3	2	2	28	Medium Low (-)								Low (-)
	Possible boost in short term local small business opportunities.	3	1	3	2	2	28	Medium Low (+)	• Golden Tropic should investigate the possibility of working together with the CMF or elected local community members or farmers to undertake the regular monitoring of environmental impacts, including poaching. By involving local community members in the monitoring process, it will engender trust in the systems being used as well as acceptance of the monitoring results • Local suppliers, especially surrounding farmers should receive preference during procurement processes • Golden Tropic should be transparent about the potential economic benefits and employment opportunities that the proposed mine is likely to effect in local communities, in order to manage any undue expectations	3	1	3	2	2	28	Medium Low (+)
	Uncertainty due to the potential impacts of mining	3	1	3	2	2	28	Medium Low (-)	• Ensure proper engagement with stakeholders on a continuous basis, including to ensure that all stakeholder concerns and inputs especially for vulnerable groups are taken into consideration • Communities must be engaged on fair and transparent terms. Communities should furthermore be informed and educated about the various ways in which Golden Tropic will contribute to socio-economic development through contributions towards their SLP goals, CSI as well as taxation • Integrate the development and implementation of policies and procedures for improving the capacity of employees and local communities	1	1	1	1	2	9	Low (-)
	Capacity building and enterprise development	2	3	3	4	3	56	Low (+)	• Develop training and skills development programs and effectively communicate training opportunities for all employees and local communities • Provide employees with opportunities for to be involved in ABET and a Young Professional Scheme (which could incorporate a certain number of bursaries per year) • Provide local communities with opportunities for ABET • Integrate the development and implementation of policies and procedures for improving the capacity of employees and local communities. Policies and procedures include the Skills Development Plan (SDP), ABET training, Core Business Training, Learnership Programmes, Bursary & Internship plan, SMME Policy, Recruitment Policy and LED Strategy	4	4	4	4	4	96	Medium High (+)
	Conversion and diversification of land use	3	1	3	2	2	28	Medium Low (-)	• Fairly compensate impacted landowners for the loss of land and negotiate a mutually beneficial agreement to ensure that there is no nett negative impact on the landowner • Educate landowners in terms of their rights and responsibilities prior to the project going ahead	1	1	1	1	2	9	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
									• Take into account surrounding and uses and design post-mining land use options to support and enhance long-term development options. • Safe and/or alternative access to the site should be provided during construction.							
Groundwater	Localised spillages of oils from machinery leaching to groundwater contamination.	3	2	2	2	2	28	Medium Low (-)	• No washing of vehicles shall be allowed outside demarcated areas. The bays will be clearly demarcated and will not be allowed to contaminate any surface runoff; • Sufficient areas shall be provided for the maintenance and washing of vehicles; • Refuelling of vehicles will only be allowed in designated areas; • All construction equipment shall be parked in a demarcated area • Drip trays shall be used when equipment is not used for some time; • On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the material; • Bund areas shall contain 110% of the stored volume; • Bund areas must be impermeable; • Bund areas must have a facility such as a valve/sump to drain or remove clean stormwater; • Contaminated water shall be pumped into a container for removal by an approved service provider; • Regular inspections shall be carried out to ensure the integrity of the bundwalls; • All preventative servicing of earth moving equipment and construction vehicles shall be undertaken off site; • Runoff from this area shall be contained; • Spill kits shall be made available, and all personnel shall be trained on how to use the kits and training records shall be made available on request.	2	1	1	2	2	16	Low (-)
	Existing boreholes within the prospecting area may create conduits of flow to the groundwater unless sealed.	3	2	2	2	2	28	Medium Low (-)		2	1	1	2	2	16	Low (-)
Surface Water	Increase in silt load in runoff due to site clearing, grubbing and the removal of topsoil from the footprint area associated with the mining areas and associated infrastructure.	2	3	2	2	2	28	Medium Low (-)	• Ensure that topsoil is properly stored, away from the streams and drainage areas; • No construction activities will be undertaken within 100 metres of the nearby steams and 500 meters from riparian areas without consent from the DWS; • Vehicle and personnel movement within watercourses and riparian areas shall be strictly prohibited; • Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses from dirty water.	1	1	1	2	2	12	Low (-)
	Potential deterioration in water quality due to the potential accidental spillages of hazardous substances.	2	3	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
	Debris from poor handling of materials and/or waste blocking watercourses, resulting in flow impediment and pollution.	2	2	2	2	2	24	Low (-)		1	1	1	2	2	12	Low (-)
	Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality.	2	3	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
	Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing occurred.	3	2	2	2	2	28	Medium Low (-)		1	1	1	2	2	12	Low (-)
	Reduction in Mean Annual Runoff will impact on water availability for downstream surface water resources users.	3	2	2	2	2	28	Medium Low (-)	• As it is extremely unlikely that the open quarrys could be relocated or reduced in extent, other possible solutions must be found. Water from the Samoep River will not be used in the operation due to its dry periodically. One such suggestion could be to avoid the granite materials to be dumped in the low line area of watercourse. This will mitigate the granite materials to be carried to the low line areas through runoff.	2	1	1	2	2	16	Low (-)
	Reduction of Peak Runoff and Discharge Volumes on Water Courses results in reduction in small PE floods	3	2	2	2	2	28	Medium Low (+)	• N/A, the impact is deemed positive therefore no mitigating measures were proposed.	3	2	2	2	2	28	Medium Low (+)
Heritage Resources	The proposed project has the potential to impact on local graves within the area.	2	1	2	2	2	20	Low (-)	• Prior to the site establishment, a heritage impact assessment must be undertaken and mitigation and /or management	1	1	1	1	1	6	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
	The proposed project has the potential to impact on sites of archaeological importance.	2	1	2	2	2	20	Low (-)	measure for the protection of such resources must be implemented; • No construction activities may be undertaken within 50 m of the heritage and/or cultural sites; • If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.	1	1	1	1	1	6	Low (-)
Palaeontological Resources	Construction activities have potential to impact on palaeontological resources	2	1	2	2	1	20	Low (-)	• Should fossils be exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.	1	1	1	1	1	6	Low (-)
Flora	Loss of localised biodiversity habitats within sensitive areas due to site clearance.	2	1	2	2	2	20	Low (-)	• The Contractor shall be on the lookout for SCC such as *Euphorbia spinea* and *Galenia africana* and any floral SCC encountered within the development footprint are to be relocated to areas with suitable habitat, outside the disturbance footprint; • Floral SCC if encountered within the development footprint, are to be handled with care and the relocation of sensitive plant species to suitable similar habitat is to be overseen by a botanist; • The proposed development footprint shall be kept to the minimum; • All disturbed areas must be concurrently rehabilitated during construction; • Prohibit the collection of any plant material for firewood or medicinal purposes; • The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the construction areas; • Edge effect control shall be implemented to avoid further habitat degradation outside of the proposed footprint area; • All sensitive open space areas will be demarcated and access into these areas shall be prohibited; • Protected floral species occurring within the vicinity of the study area, but outside the disturbance footprint shall be fenced for the duration of the construction activities; • Monitoring of relocation success will be conducted during the operational phase; • Construction related activities shall be kept strictly within the development footprint; • Construction vehicles shall only be allowed on designated roadways to limit the ecological footprint of the project. • Alien Invasive Plant Species Management plan to be implemented; • Edge effects of activities including erosion and alien/ weed control will be strictly managed in the riparian area; • All sites disturbed by construction activities shall be monitored for colonisation by exotic or invasive plants; • Exotic or invasive plants shall be controlled as they emerge; • An alien vegetation control program must be developed and implemented within all disturbed areas. After removal of alien vegetation, the affected areas must be re-assessed to determine the success of the program and any follow up measures that may be required; • The eradicated plant material must be disposed of at an approved solid waste disposal site; • During post-construction, an alien vegetation removal and monitoring plan must be compiled for those areas which were not effectively rehabilitated; • The extent of invasion must be established through investigation to identify priority areas; • Priority species shall be identified to control and develop protocols for the removal of all alien species e.g. mechanical removal, herbicidal treatment etc. Mechanical, methods must be favoured for the removal of alien invasive species.	1	1	1	1	2	9	Low (-)
	Loss of localised floral species diversity including RDL and medicinal protected species due to site clearance.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Potential spreading of alien invasive species as indigenous vegetation is removed, and pioneer alien species are provided with a chance to flourish.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
									Chemical removal shall only be undertaken by a suitably qualified and approved person; and • As much vegetation growth as possible must be promoted in order to protect soils. In this regard, special mention is made of the need to use indigenous vegetation species where hydro seeding, rehabilitation planting (where applicable) are to be implemented.							
Fauna	Vegetation clearance may result in loss of faunal habitat ecological structure, species diversity and loss of species of conservation concern.	2	1	2	2	2	20	Low (-)	• The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas; • No trapping or hunting of fauna shall be permitted; • Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed; • Should any SCC be encountered within the study area, these species will be relocated to similar habitat within or in the vicinity of the study area with the assistance of a suitably qualified specialist; • No informal fires in the vicinity of construction areas shall be permitted; • An alien vegetation control plan must be developed and implemented in order to manage alien plant species occurring within the study area, and to prevent further faunal habitat loss.	1	1	1	1	2	9	Low (-)
	Habitat fragmentation as a result of construction activities of the access roads leading to loss of floral diversity.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Loss of faunal diversity and ecological integrity as a result of construction activities, erosion, poaching and faunal specie trapping.	2	2	2	2	2	24	Low (-)		1	1	1	1	2	9	Low (-)
	Movement of construction vehicles and machinery may result in collision with fauna, resulting in loss of fauna.	2	2	2	2	2	24	Low (-)		1	1	1	1	1	6	Low (-)
Air Quality	Possible increase in dust generation, PM_{10} and $PM_{2.5}$ as a result of bulk earthworks, operation of heavy machinery, and material movement.	2	2	2	2	2	24	Low (-)	• Dust suppression measures shall be implemented on dry weather days and periods of high wind velocities; • Appropriate dust suppression measures may include spraying with water; • Where practical rehabilitation should be undertaken in tandem with the construction activities; • A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved road; • All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution; • Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; • Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; • Where practical rehabilitation should be undertaken progressively; • Materials transported on public roads must be covered; Odours: • Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; and • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.	1	2	1	1	2	12	Low (-)
	Increase in carbon emissions and ambient air pollutants (NO_2 and SO_2) as a result of movement of vehicles and operation of machinery/equipment.	2	2	2	2	2	24	Low (-)		1	2	1	1	2	12	Low (-)
Visual	Scaring of the landscape as a result of the clearance of vegetation.	2	1	2	2	2	20	Low (-)	• The number of construction vehicles and machinery to be used shall be kept to a minimum; • Movement of vehicles shall be kept to outside busy hours to minimise the visual impacts on the residents; • Materials transported on public roads must be covered; and • Where possible, rehabilitation of the work areas shall be undertaken in tandem with construction to ensure that areas stripped of vegetation are kept to a minimum.	1	1	1	1	2	9	Low (-)
	Visual intrusion as a result of the movement of machinery and the establishment of the required infrastructure.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
Noise	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity.	2	2	2	2	2	24	Low (-)	• Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e.gw. noise) in advance; • Surrounding communities must be notified in advance of noisy construction activities; • All equipment should be provided with standard mufflers;	1	1	1	2	1	9	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
									• Muffling units on vehicles and equipment must be kept in good working order. • Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment; • Where possible, operation of several equipment and machinery simultaneously must be avoided; • All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping fanbelts, worn bearings and other sources of noise; • Equipment must be operated within specifications and capacity (e.g. no overloading of machines); • Regular maintenance of equipment must be undertaken, particularly with regard to lubrication; • Equipment shall be switched off when not in operation; • Appropriate directional and intensity settings must be maintained on all hooters and sirens; • The Contractor must ensure that the employees conduct themselves in an appropriate manner while on site; and • Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 18H00 and Saturday 07H00 -14H00).							
Soil, Land use and Land Capability	Localised chemical pollution of soils as a result of vehicle hydrocarbon spillages and compaction.	2	1	2	2	2	20	Low (-)	• Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEMWA, or can be removed by a service provider that is qualified to clean the soil; • The time in which soils are exposed during construction activities should remain as short as possible; • Erosion control measures shall be implemented where deemed necessary; • In general, all steep slopes steeper than 1:3 or where the soils are more prone to erosion must be stabilised; • If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion; • Runoff from stockpiles shall be detained in order to support growth of vegetation; • Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; • Vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; • A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; • If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; • Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes; • Topsoil stockpiles shall be monitored regularly to identify alien vegetation, which shall be removed as soon as possible to prevent further distribution of any alien vegetation.	1	1	1	2	1	9	Low (-)
	Localised clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Localised loss of resource and its utilisation potential due to compaction over unprotected ground/soil.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
	Localised loss of soil and land capability due to reduction in nutrient status - de-nitrification and leaching due to stripping and stockpiling footprint areas.	2	1	2	2	2	20	Low (-)		1	1	1	1	2	9	Low (-)
Traffic	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion along the Public roads as well as the farm roads around the prospecting area.	2	3	2	2	2	28	Medium Low (-)	• Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; • The number of construction vehicles and trips shall be kept to a minimum; and • Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	2	2	2	1	2	18	Low (-)
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low (-)	• All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	2	1	1	1	8	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
Geology	Removal of local geology as a result of construction activities.	2	1	2	2	2	20	Low (-)	• The footprint of the construction activities shall be kept to a minimum.	1	1	1	1	2	9	Low (-)
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices.	2	3	2	2	2	28	Medium Low (-)	Separation of waste: • All waste shall be separated into general waste and hazardous waste; • Hazardous waste shall not be mixed with general waste and in doing so increase the quantities of hazardous waste to be managed; • General waste can further be separated into waste that can be recycled and or reused; • No littering shall be allowed in and around the site, a sufficient number of bins shall be provided for the disposal of waste; • Where necessary dedicate a storage area on site for collection of construction waste. Storage of waste: • No stockpiling of debris shall be permitted within 100 m of any water courses and drainage lines, or within 500 m of riparian areas; • General waste will be collected in an adequate number of litter bins located throughout the construction site; • Bins must have lids in order to keep rainwater out; • Bins shall be emptied regularly to prevent them from overflowing; • All work areas shall be kept clean and tidy at all times; • All waste management facilities will be maintained in good working order; • Waste shall be stored in demarcated areas according to type of waste; • Runoff from any area demarcated for waste will be contained, treated and reused; • Flammable substances must be kept away from sources of ignition and from oxidizing agents; • No construction rubble shall be disposed of to the riparian area; • If construction rubble is not removed immediately it shall be stockpiled outside the 1:100-year floodline and outside the sensitive riparian areas; • Demolition waste and surplus concrete shall be disposed of responsibly; • Waste shall not be buried or burned on site; and • The maximum retention time for temporary storage of waste generated shall not exceed 30 days, provided the waste does not present a health hazard or risk of odour. Disposal of hazardous waste: • No dumping shall be allowed in or near the construction site; • Hazardous containers shall be disposed of at an appropriate licensed site; • Hazardous waste will be removed and managed by an approved service provider; • A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste; and • The safe disposal certificate shall be stored and provided on request. Disposal of general waste: • No dumping shall take place in or near the construction site; • All general waste shall be disposed of to the nearest licensed landfill site; • Demolition waste and builders rubble shall be disposed of to an appropriate licensed landfill site; and • The necessary permissions must be obtained to dispose of builders' rubble to the landfill site.	2	2	2	1	2	18	Low (-)

13.2 Operational Phase

During the operational phase, the following main activities will take place:

- Mining and cutting (if required) of the granite (quarrying);
- Water and stormwater management;
- Maintenance of infrastructure;
- Maintenance of topsoil stockpiles;
- Machinery movement during mining activities; and
- Transportation of rocks;

The following impacts are envisaged during the operational phase.

13.2.1 Social-Economic

The project is expected to have the following socio-economic impacts:

- Positive impacts on production: On average, the mine will sell ROM and generate a revenue over the 10 years as summarised in Table 13-3.

Table 13-3: Production forecast for the applied period of 10 years

Year	Total Production	Saleable m³@ 25% recovery	Price /m³ inflation 3%	Revenue
1	70 560	17 640	2300	40 572 000.00
2	70 560	17 640	2369	41 789 160.00
3	70 560	17 640	2440.07	43 042 834.80
4	71 400	17 850	2513.2721	44 861 906.99
5	72 000	18 000	2588.670263	46 596 064.73
6	80 000	20 000	2666.33	53 326 607.42
7	80 000	20 000	2746.32	54 926 405.64
8	80 000	20 000	2828.71	56 574 197.81
9	80 000	20 000	2913.57	58 271 423.74
10	80 000	20 000	3000.98	60 019 566.46

- Impact on employment: The proposed mine will create 88 employment opportunities. Such employment opportunities will assist in lowering the unemployment the LM and DM.
- Impact on skills development: Through its Social Labour Plan (SLP), the proposed mine aims to develop skills for its employees. It plans on training its employees to be competent and ensuring that they are provided opportunities to acquire portable skills. Besides ensuring the availability of specific mining skills as well as increasing competency in the mine workforce, the HRDP is also aimed at equipping the employees with skills that could sustain them and be utilised in other sectors outside of mining. Furthermore, the Mine's SLP is also aimed at ensuring that the local communities and HDSA companies are offered opportunities to develop

educationally and economically. Overall, it is clear that the skills programmes to be applied during mining operations are holistic, given that they cover qualification attainment, basic education provision, on the job training, etc. If implemented accordingly, the skills levels particularly of the local community will improve and thus enable employees to acquire future employment.

- Impact on household income: Households will benefit directly from the mine's operation and will increase access to financial capital for workers;
- Impact on Government Revenue: Government revenue will be derived from payments of income taxes, royalties, contributions towards national skills fund, fee payments in line with respective regulations, and payroll taxes as a result of mining operations.
- The immediate project area is predominantly agricultural, game farming and tourism, therefore the pre-construction and construction activities have potential to impact on the economic activities of surrounding areas. There is a risk that the surrounding game farmers might lose income due to the following:
    - The reduction in guests (ecotourists and hunters) due to the change in the natural scenic environment as well as the noise and dust coming from the mine.
    - Reduction in wildlife (and livestock in some cases) due to increased criminal activity (poaching) resulting from the increased movement of people into the area.
    - Possible loss of wildlife due groundwater contamination resulting from mining activities.

The social impacts envisaged as a result of the operational phase of the proposed project include:

- Negative impact as a result of the project as there will be additional trucks on the roads, impacting on local communities' health and safety;
- Negative impact on, local community health and safety due to influx of employees, the presence of job seekers, which may lead to prostitution and conflict with the local communities. Illegal informal settlement of job seekers in the area may exacerbate the situation;
- Generation of dust and noise potentially resulting in a health and nuisance impact; and
- Health and safety risk as a result of the movement of construction vehicles increasing the risk of accidents.

13.2.2 Groundwater

The following potential groundwater impacts during the operational phase were identified:

- The use of vehicles during the mining activities may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater.
- Abstraction of water for use during the operational phase of the mine may result in groundwater drawdown. However, the groundwater study noted that the required amounts are so low that no impacts will be visible on the neighbouring users.
- Poor housekeeping – overflows, spillages and leakages from sewerage conservancy tank once installed and containment facilities may result in groundwater contamination.
- Seepages from waste dumps, residue stockpiles/deposits and waste management facilities may result in contamination of groundwater resources.

13.2.3 Surface water

The rainfall water within the dirty water areas that forms part of the MAR to the local water courses will be removed from the catchment and may reduce the quantity of water available to downstream users. There is potential for contamination of surface water due to releases of dirty water (runoff and return water). Spillages of hydrocarbons and other chemicals and accidental discharges could result in the contamination of surface water resources.

13.2.4 Biodiversity

The project may result in the following impacts on the floral environment during the operation phase:

- Destruction of potential floral habitats as a result of continual disturbance of soil, leading to altered floral habitats, erosion and sedimentation;
- Impact on floral diversity as a result of possible uncontrolled fires;
- Potential spreading of alien invasive species as a result of floral disturbance; and
- Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase.

The project may result in the following impacts on the faunal environment during the operation phase:

- Migration of fauna from the mining area due to noise as a resulting of mining activities;
- Loss of faunal species due to collisions with vehicles and machinery;
- Loss of faunal diversity and ecological integrity as a result of poaching and faunal species trapping;
- Failure to initiate a rehabilitation plan and alien control plan during the operation phase may lead to further impacts during the operation phase.

13.2.5 Soils, Land Use and Land Capability

The use of vehicles during the operation of the project may result in the spillages of hydrocarbons from the vehicles and machinery, resulting in the contamination of soils.

The materials removed from the mining activities has potential for contamination should it not be managed properly, which may render the land not usable after backfilling operation.

13.2.6 Air Quality

The movement of vehicles and mining machinery will likely result in an increase in nuisance dust, NOx, PM10 and PM2.5. There is also potential for increase in carbon emissions and ambient air pollution due to the movement of vehicles and mining machinery. It is expected that the implementation of dust suppressing mitigation measures will result in the reduction in nuisance dust.

13.2.7 Visual Impacts

The operational phase of the project will potentially result in visual impacts due to loss of sense of place due to:

- On-going mining activities, including removal of granite blocks and potentially increasing the height of the stockpile and dumps.
- Generation of dust leading to visual intrusion, visual exposure of receptors and impacts on the overall landscape character.

The operation of the mine will inevitably scar the landscape.

13.2.8 Geology Impacts

It is anticipated that the removal of soils as a result of operational activities and the extraction of the granite resources will result in the removal of local geology.

13.2.9 Heritage, Archaeological Resources

Although no heritage resources were recorded during the HIA, the specialist noted that there remains a chance of chance finds and unmarked graves that may have been missed during the assessment. As such, there is potential for the operational activities to result in the following heritage/archaeological impacts:

- The proposed project has the potential to impact on local graves within the area; and
- The proposed project has the potential to impact on sites of archaeological importance.

13.2.10 Palaeontology Impacts

The operational activities may result in the destruction of fossils (if any).

13.2.11 Ambient Noise

The following noise impact is envisaged as a result of the operational phase of the proposed project:

- The use of vehicles and machinery during the operational phase may generate noise in the immediate vicinity;
- Increase in ambient noise levels as a result of the mining activities. The assembling of mine related equipment and/or structures during the operational phase will inherently generate a degree of noise emissions.

13.2.12 Traffic

The movement of vehicles in the project area will result in an increase in traffic on the roads.

13.2.13 Climate

The movement of vehicles and machinery may result in the production of carbon dioxide (Green House Gas), which may have an impact on the climate in the area.

13.2.14 Blasting ad Vibrations

Marbles, slates, sandstones and quartzites mining will be by non-explosive splitting and cutting techniques, while in granites blasting techniques may be applied. The physical properties of the stone are likely to determine what type of explosives will be applied.

The following impacts are envisaged as a result of blasting activities:

- Impact of ground vibration on houses, boreholes and roads, resulting in possible damage to infrastructure;
- Air blast impact on houses, boreholes and roads, resulting in possible damage to infrastructure;
- Fly rock impact on houses, boreholes and roads, resulting in possible damage to infrastructure; and
- Impact of fumes on nearby land occupiers, boreholes and road users.

13.2.15 Topography Impacts

As a result of operational phase activities, the following impacts are envisaged as a result of the operational phase:

- The continuous placement of ore material onto the demarcated ore stockpile area will modify the local topography of the site-specific area.
- Progressive mining of the area will ultimately alter the topography.

The summary of the impact assessment during the operation phase is provided in Table 13-4.

Table 13-4: Impact Assessment Table for the Operation Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
Socio-Economic	Positive impact on the possible temporary job opportunities.	3	2	2	2	2	28	Medium-Low (+)	• Mitigation measure contained in the construction phase table will apply	3	2	2	2	2	28	Medium-Low (+)
	Effect of in-migration of job seekers and workers on social dynamics	3	3	4	3	3	60	Medium High (-)		2	3	3	2	2	32	Medium-Low (-)
	Economic impacts and material wellbeing of property owners in the area	3	3	4	3	3	60	Medium-High (-)		2	3	3	2	2	32	Medium-Low (-)
	Impact on local economy due to economic opportunities for local and regional business	2	3	3	2	2	32	Medium-Low (+)		2	3	3	2	2	32	Medium-Low (+)
	Uncertainty due to the potential impacts of mining	3	3	4	3	3	60	Medium-High (-)		2	3	3	2	2	32	Medium-Low (-)
	Conflict due to noise	3	3	4	3	3	60	Medium-High (-)		2	3	3	2	2	32	Medium-Low (-)
	Conflict due to nuisance dust and emissions	3	3	4	3	3	60	Medium-High (-)		2	3	3	2	2	32	Medium-Low (-)
	Capacity building and enterprise development	2	3	3	2	2	32	Medium-Low (+)		2	3	3	2	2	32	Medium-Low (+)
	Gender Equality	2	3	3	2	2	32	Medium-Low (+)		2	3	3	2	2	32	Medium-Low (+)
	Impacts on health and social wellbeing	3	3	4	3	3	60	Medium High (-)		1	2	2	2	2	20	Low (-)
	Potential increase in social pathologies and negative health impacts due to contractor camp and potential squatting of job seekers.	3	2	2	2	2	28	Medium-Low (-)		3	1	3	1	1	14	Low (-)
	Potential for health and safety risks due to mining operations for the mine personnel as well as adjacent landowners and fauna.	3	3	4	3	3	60	Medium High (-)	• The mine will inform landowners of any activities that may pose a safety risk before implementation; • Include a component covering all potential health and safety issues in the Health and Safety Induction to sensitize all personnel and contractors about this subject; • Other health and safety mitigation measures are included under relevant sections such as blasting and vibrations, noise and air quality; and • Establish complaints register with an open line to a relevant person that can act if there are complaints	2	3	3	2	2	32	Medium-Low (-)
Blasting and Vibrations	Impact of ground vibration on houses, boreholes and roads, resulting in possible damage to infrastructure	3	3	2	2	2	32	Medium Low (-)	• Reduce Charge Mass/Delay over decreasing distance towards POI's of concern; • Relocate POI's of concern at least 600 m; • Re-drill boreholes further away which will be impacted on by the blasting activities, should these boreholes be utilised at a later stage.; • Reroute affected roads; • Notify all affected parties in advance prior to any blasting activity;	2	1	1	2	1	12	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability					Consequence			Probability			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									• Prior to blasting a 500 m radius must be cleared of people and animals; • Immediate action will take place should thresholds exceed legal requirements for air blast (134 dB) and ground vibration (12.5 mm/s).							
	Air blast impact on houses, boreholes and roads, resulting in possible damage to infrastructure	3	3	2	2	2	32	Medium Low (-)	• Reduce Charge Mass/Delay over decreasing distance towards POI's of concern; • Relocate POI's of concern at least 600 m;	2	1	1	2	1	12	Low (-)
	Fly rock impact on houses, boreholes and roads, resulting in possible damage to infrastructure;	2	2	3	2	3	35	Medium Low (-)	• Increase stemming length; • Put in controls for management of stemming lengths, • Relocate POI's of concern at least 600 m.	2	1	1	2	1	12	Low (-)
	Impact of fumes on nearby land occupiers, boreholes and road users.	1	2	2	3	3	30	Medium Low (-)	• Use correct products; • Control product quality; • Prevent sleep time for charged blast holes; • Same day charge and blast.	2	1	1	2	1	12	Low (-)
Groundwater	Storage of hydrocarbons and chemicals, which may impact on groundwater as a result of spillages and uncontrolled release.	3	2	2	2	2	28	Medium-Low (-)	• All spillages will need to be cleaned up as soon as practically possible; • Maintain construction vehicles and encourage contractors to report, react and manage all spills and leaks so that action can be taken to immediately minimise contamination to the groundwater; • Spill kits will be made available in areas of likely spillage; • All hydrocarbon storage containers will be stored within a bunded areas which are watertight and able to contain 110% of the stored volume; • All infrastructures must be regularly inspected to ensure that they are in good working order. • All equipment utilising hydrocarbons will be stored on a hard-standing surface. • The groundwater monitoring plan must be strictly followed	2	1	2	1	2	15	Low (-)
	Overflowing, spillages and leakages from sewage conservancy tank	3	2	2	2	2	28	Medium-Low (-)		2	1	2	1	2	15	Low (-)
	Seepages from waste dumps, residue stockpiles/deposits and waste management facilities may result in contamination of groundwater resources.	3	2	2	2	2	28	Medium-Low (-)		2	1	2	1	2	15	Low (-)
	Groundwater drawdown due to abstraction.	2	2	2	2	2	24	Low (-)	• Use water in a closed circuit and recycle water at all times. • Avoid over abstraction of groundwater by using the boreholes at a low rate and also reduce the duty cycles to 8 to 10 hours and do not use boreholes for 12h/d. • Implement frequent (preferably with loggers) monitoring of water levels and water quality in boreholes local to the mining area. • Boreholes must be used at the rates recommended in table below.	2	1	2	1	2	15	Low (-)

BH	Available Drawdown (m)	Recom. Pump intake (mbgl)	Max Pumping Water Level (mbgl)	Recom. Pump Rate	
				L/s 10h/d	m3/d
P2 Cape Autumn	50	60	60	0.15	12.96
P3 HQ Pump				0.15	12.96
P4 Red Solar Pump	17	28	13.5	0.7	60.48
P6 Blue Pump	35	55	50	0.15	12.96
P9 Pink Pump 2				0.15	12.96
P10 Pink Pump	40	48	38	0.25	21.6
TOTAL				1.55	133.92

• Minimise wastewater and fresh water usage by the appropriate engineering design and re-use/recycling for other purposes where possible.
• Sewage tanks and or infiltration pits must be constructed far away from permeable formations and significant aquifer systems. The area

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
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		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
									at the accommodation facilities are regarded as suitable for those structures, based on the depth to groundwater level and relatively thick, sand cover; The inner protection zone is an area of at least 50m x 50m, cantered on the actual boreholes. The following measures must be applied in this protection zone: • No quarry latrines, VIP'S, soak-away or septic tank tanks – to prevent effluent from percolating into the aquifer and boreholes; • No storage fuel, lubricants or other hazardous substances without a leak prove; • Production boreholes for domestic use must be equipped with a sanitary seal – to prevent contaminated surface water and spilled fuel from percolating down the casing into the borehole; • The concrete collar around borehole casing must be at least 100 mm higher than the floor or surface level to prevent spilled fuel, water from leakages, wash water, etc to enter the borehole. • No ponding of surface water must be allowed, i.e. the area must be sloped for surface water to drain away from this zone; • Vegetation, other than trees and large bushes, should be maintained in this zone – NB Roots of bushes and trees growing near boreholes often grows into the borehole where they can cause considerable problems; • The boreholes and pumping equipment must be housed in a lockable pump house. For this purpose, a removable cage manufactured out of galvanised steel mesh and corrugated steel sheets is recommended. This cage, rather than a brick building, is recommended as it can be ready removed in case the boreholes is damaged or if it needs to be re-developed and clean; • The production boreholes, as well as other monitoring boreholes in the area, must be properly sealed to prevent entry of reptiles, insects, birds and small rodents; • The entire area should be properly fenced with a lockable gate to prevent unauthorised entry and exclude animals. The gate must be positioned and of such a type that allows easy vehicle access; and • A signboard must be erected on the gate warning people of the dangers and that unauthorised entry is not allowed.							
Surface Water	Impact on water quality and availability as a result in ineffective dirty water separation, and dirty water entering into the wetland.	2	2	2	2	2	24	Low (-)	• Monitor and maintain good vegetation cover, to reduce runoff; • Develop and implement controls to clean up oil/diesel leaks and spillages of any designated hazardous waste.	2	1	2	1	2	15	Low (-)
	Improper site management may result in runoff from latrines and domestic waste which could pollute surface water resources	2	3	3	2	2	32	Medium Low (-)	• A waste management plan will be compiled and approved for implementation of site. This management plant should focus on the waste hierarchy of the NEM:WA; • No waste may be disposed of to land without the necessary legal permits; • Waste will be removed from site by an accredited waste removal company and legally disposed of. Disposal certificates will be kept on site for audit purposes; • Sufficient waste receptacles will be placed around the site allowing the separation of waste as source.	1	2	2	2	2	**20**	Low (-)
	Impacts on surface water resources quality as a result of incorrect waste management practises and pollution.	2	3	3	2	2	32	Medium Low (-)		1	2	2	2	2	**20**	Low (-)
	Potential deterioration in water quality due to the potential accidental spillages of hazardous substances.	2	3	2	2	2	28	Medium Low	• Vehicle and personnel movement within watercourses and riparian areas shall be strictly prohibited; • Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses from dirty water.	1	1	1	2	2	12	Low (-)
	Debris from poor handling of materials and/or waste blocking watercourses, resulting in flow impediment and pollution.	2	2	2	2	2	24	Low (-)	• All infrastructures must be regularly inspected to ensure that they are in good working order. •	1	1	1	2	2	12	Low (-)
	Contaminated dirty water runoff to surrounding areas resulting in the impact on local surface water quality.	2	3	2	2	2	28	Medium-Low (-)		1	1	1	2	2	12	Low (-)

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		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating
	Seepages from waste dumps, residue stockpiles/deposits and waste management facilities may result in contamination of groundwater resources.	3	2	2	2	2	28	Medium-Low (-)		2	1	2	1	2	15	Low (-)
	Increase of surface runoff and potentially contaminated water that needs to be maintained in the areas where site clearing occurred.	3	2	2	2	2	28	Medium-Low (-)		1	1	1	2	2	12	Low (-)
	Reduction in Mean Annual Runoff will impact on water availability for downstream surface water resources users.	3	2	2	2	2	28	Medium-Low (-)	• As it is extremely unlikely that the open quarrys could be relocated or reduced in extent, other possible solutions must be found. Water from the Samoep River will not be used in the operation due to its dry periodically. One such suggestion could be to avoid the granite materials to be dumped in the low line area of watercourse. This will mitigate the granite materials to be carried to the low line areas through runoff. • The clean stormwater will be diverted which further mitigates the impact.	2	1	1	2	2	16	Low (-)
	Reduction of Peak Runoff and Discharge Volumes on Water Courses results in reduction in small PE floods	3	2	2	2	2	28	Medium Low (+)	• N/A, the impact is deemed positive therefore no mitigating measures were proposed.	3	2	2	2	2	28	Medium Low (+)
Biodiversity	Continued destruction of potential floral habitats for species of conservational concern as a result continual disturbance of soils leading to altered floral habitats, erosion and sedimentation.	2	1	3	2	2	24	Low (-)	• All disturbed areas must be rehabilitated in tandem with construction activities. • The collection of any plant material for firewood or medicinal purposes shall be strictly prohibited. • The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the demarcated mining areas.	2	1	1	1	1	8	Low (-)
	Impact on floral species of conservational concern as a result of an increased in alien species proliferation and ineffective rehabilitation of exposed areas	2	1	3	2	2	24	Low (-)		2	1	1	1	1	8	Low (-)
	Loss of faunal habitat and ecological structure as a result of increased fires during operation and introduction of alien species, leading to transformation of the natural habitat	2	1	3	2	2	24	Low (-)	• The rehabilitation of the disturbed areas must be conducted such that the rehabilitated areas will encourage the migration of animals back into the rehabilitated areas. • The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas. • No trapping or hunting of fauna shall be permitted. • Edge effects of all operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat shall be strictly managed. • No informal fires in the vicinity of mining area shall be permitted. • An alien vegetation control plan must be implemented in order to manage alien plant species occurring within the study area, and to prevent further faunal habitat loss. • Poaching of wild animals and livestock will be prohibited.	1	1	1	1	1	6	Low (-)
Soils Land use and Land Capability	Topsoil removal, storage and replacement during the excavation of the sumps will result. This will result in the disruption of the soils profile.	2	1	2	2	2	20	Low (-)	• Ensure that topsoil is properly stored, away from the streams and drainage areas. • The soils must be used for the backfilling and rehabilitation of the sumps.	1	1	1	1	1	6	Low (-)
	Soil contamination as a result of operational activities can be as a result of a number of activities (i.e. hazardous substance storage, incidental hydrocarbon leakages from construction vehicles).	3	1	2	2	2	24	Low (-)	• The rehabilitated sump must be seeded with recommended seed mix consisting of indigenous species. • Tarpaulins will be placed on the ground to prevent oil, grease, hydraulic fluid and diesel spills during emergency repairs. • Soil disturbance within the mining areas shall be kept to a minimum. •	2	1	1	1	1	8	Low (-)
Air Quality	The mining operation will require vehicular movement which may result in Possible increase in dust generation, PM10 and PM2.5 as a result of stockpiling material, use of heavy machinery, and material movement.	2	3	2	2	2	28	Medium-Low (-)	• Dust suppression must be conducted during the operational phase of the project. • Correct speed will be maintained at the proposed project site. • Vehicle maintenance must be conducted regularly to avoid excessive diesel fumes. • Where practical possibly rehabilitation should be undertaken progressively. • A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved roads.	1	1	1	1	1	6	Low (-)
	Increase in carbon emissions and ambient air pollutants (NO2 and SO2) as a result of movement of vehicles and operation of machinery/equipment.	2	3	2	2	2	28	Medium-Low (-)		1	1	1	1	1	6	Low (-)

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									• All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution. • Dust control suppression shall be implemented on dry weather days and periods of high wind velocities; • A continuous PM10 and PM2.5 monitoring should be installed at the mine or if possible, at sensitive receptors in close proximity to the mine. • Conduct periodic independent audits of monitoring systems and the implementation of management plans to ensure that the system is maintained, and that suitable data is obtained for decision making. • Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; • Materials transported on public roads must be covered; and • Where practical rehabilitation should be undertaken progressively. • Odours • Putrescible waste must be handled, stored and disposed of before the probability of it generating odours. • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer.							
Visual	Scaring of the landscape as a result of the clearance of vegetation and preparation of the mine expansion.	2	2	2	2	2	**24**	Low (-)	• It is recommended that stockpiles be vegetated with indigenous vegetation in order to blend more easily into the existing landscape and for screening purposes; • The design and height increase of stockpiles and dumps must be monitored to ensure that these components relate to acceptable environmental standards in terms of slope and elevation; • Stockpiles are ideally to be shaped at an adequate slope from the commencement of the project to ensure that it integrates more successfully into the natural topography of the visual landscape; • It must be ensured, wherever possible, that existing natural vegetation is retained in the vicinity of the infrastructure areas; • The access gravel roads should be irrigated on a regular basis, with just enough moisture to keep the dust down without creating undue runoff; • Soil stockpiles must be kept damp during the dry season, and preferably be vegetated in order to minimise the potential for dust generation; • Vehicle speed on gravel roads must be reduced to limit dust generation; • As far as possible, operational activities should take place during the daylight hours, in order to limit the use of bright floodlighting and to avoid the use of additional night-time lighting which may lead to skyglow; • Outdoor lighting must be strictly controlled; • The use of high light masts and high pole top security lighting should be avoided along the periphery of the operations. Any high lighting masts should be covered to reduce sky glow; • Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surrounding of the mining infrastructure, thereby minimising the light spill and trespass; • Censored and motion lighting may be installed at office areas, workshops and other buildings to prevent use of lights when not needed; • Vehicle-mounted lights or portable light towers are preferred over permanently mounted lighting for night- time maintenance activities. If possible, such lighting should be equipped with hoods or louvers and be aimed toward the ground to avoid causing glare and skyglow. The use of permanent signs and project signs should be in accordance with the requirements of the project and mining regulations, be minimised and visually unobstructive.	1	1	1	1	1	**6**	Low (-)
	Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.	1	2	2	3	3	**30**	Medium Low (-)		1	1	1	2	2	**12**	Low (-)
Heritage Resources	The proposed project has the potential to impact on sites of archaeological importance	3	2	2	1	2	21	Low (-)	• Care should be taken that, when development commences, if any archaeological and/or historical sites are discovered, a qualified archaeologist be called in to investigate the occurrence;	1	1	1	1	1	6	Low (-)

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		Consequence			Probability	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency: Activity			
									• All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made; Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.							
Palaeontology Impacts	Sealing-in or destruction of the fossils during earth moving activity	3	2	2	1	2	21	Low (-)	• If any palaeontological material is exposed during digging or excavating, SAHRA must be notified. All development activities must be stopped, and a palaeontologist should be called in to determine proper mitigation measures, especially for shallow caves.	2	1	1	2	2	**16**	Low (-)
Geology	Removal of local geology as a result of construction activities.	2	1	2	2	2	20	Low (-)	• The footprint of the construction activities shall be kept to a minimum.	1	1	1	1	2	9	Low (-)
Noise	The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity	2	2	2	2	2	24	Low (-)	• Hauling vehicles with low noise levels to be used and must be maintained in a good order at all times; • Vehicle maintenance plan to be put in place and to be followed; • Implement a noise monitoring programme to measure against the baseline noise assessment; • The project will investigate using equipment and applying technology that results in the generation of less noise than existing equipment and technology; • Building activities to take place during daytime only; • Safe blasting methods to be used under controlled conditions; Emergency generators to be placed in such a manner that it is away from residential areas.	1	1	1	1	1	6	Low (-)
	Increase in ambient noise levels as a result of the mining activities.	2	2	2	2	2	24	Low (-)		1	1	1	1	1	6	Low (-)
Traffic	Increase in traffic volumes as a result of pre-construction activities which may lead to an increase in traffic congestion along the public roads as well as the farm roads around the mining area.	2	3	1	2	2	24	Low (-)	• Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; and • Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents.	1	2	1	1	1	8	Low (-)
Climate	Emissions of Green House Gases as a result of the use of plant, heavy moving machinery, generators etc.	2	2	2	2	2	24	Low (-)	• The number of n vehicles and trips shall be kept to a minimum • All the vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency.	1	1	1	1	1	6	Low (-)
Topography Impacts	Progressive mining of the area will ultimately alter the topography.	3	3	2	2	2	**32**	Medium Low (-)	• Bush clearance will only take place in designated areas and as minimal as possible; The operational site will be screened to minimise the visual disturbance to surrounding landowners.	1	1	1	1	1	6	Low (-)
Geology	Removal of local geology as a result of the mining of granite.	2	2	2	2	2	24	Low (-)	• Mining will be conducted strictly according to the mine plan that will be submitted to the DMR; • Optimally exploit this resource in terms of tonnage of rock mined and cost as provided for in the mine plan.	1	1	1	1	1	6	Low (-)
Waste Management		2	1	1	2	2	16	Low (-)	• Storage of waste • General waste will be collected in an adequate number of litter bins located throughout the construction site; • Bins must have lids in order to keep rainwater out; • Bins shall be emptied regularly to prevent the bins from overflowing; • All work areas shall be kept clean and tidy at all times; • All waste management facilities will be maintained in good working order; • Waste shall be stored in demarcated areas according to type of waste; • Runoff from mining areas will be contained, treated and reused; • Flammable substances must be kept away from sources of ignition and from oxidizing agents; • No storage of waste shall be permitted within 100 m of the water courses or within 500 m of riparian areas; • Demolition waste and surplus concrete shall be disposed of responsibly; • Waste shall not be buried or burned on site; and • The maximum retention time for temporary storage of waste generated shall not exceed 30 days, provided the waste does not present a health hazard or risk of odour. • Disposal of hazardous waste	1	1	1	1	1	6	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Probability	Frequency: Impact	Significance	Significance Rating		Consequence			Probability	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity				Management and Mitigation Measures	Severity	Spatial	Duration	Frequency: Activity			
									• No dumping shall be allowed in or near the construction site; • Hazardous containers shall be disposed of at an appropriate licensed site; • Hazardous waste will be removed and managed by an approved service provider; • A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste; and • The safe disposal certificate shall be stored and provided on request. • Disposal of general waste • No dumping shall take place in or near the mining areas; and • All general waste shall be disposed of to the nearest licensed landfill site.							

13.3 Decommissioning and Closure

The main activity that will take place during this phase of the project is the demolition and removal of mining related infrastructure. The potential impacts associated with demolition activities are similar to the anticipated impacts to occur during the construction phase. The impacts and mitigation measures have been dealt with during the discussions of the construction activities and will not be recaptured in this section, only references will be made where applicable.

13.3.1 Demolition of Project Related Infrastructure

The decommissioning and closure of the mine will entail the demolition and removal of the majority of the project related Infrastructure:

13.3.2 Potential Impacts and Mitigation Measures

It is anticipated that the potential impacts of this activity in the rehabilitation phase will be the same as the anticipated impacts listed in the construction phase. It is therefore recommended that the mitigation/management measures applicable to the construction phase are implemented. The following additional mitigation measures, as listed in Table 13-5, can be applied during the closure/rehabilitation phase in terms of the demolition of the project related infrastructure.

Table 13-5: Additional Mitigation Measures

Environmental Aspect	Additional Mitigation Measures
Soil, Land Use and Land Capability	• Once the site has been cleared of infrastructure and potential contamination, the slope must be re-graded (slope) in order to approximate the pre-mining aspect and contours. The previous infrastructure footprint area must be ripped a number of times in order to reduce soil compaction. The area must then be covered with topsoil material from the stockpiles. • Replacement of nutrient and organic carbon needs and requirements at time of rehabilitation, landscaping of the topographic slope, cultivation of soils and replacement of vegetative cover as soon after replacement of materials as possible. Monitoring of vegetative growth until self-sustaining. • Ensure that the soil conservation plan is implemented where necessary during the rehabilitation phase; • All buildings, structures and foundations not part of the post-closure land use plan must be demolished and removed from site; • Frequent visual observations should be undertaken to confirm if vegetation has re-established and if any erosion gullies have developed. In the event that vegetation has not re-established, and erosion gullies have developed, remedial action should be taken.
Biodiversity	• All soils compacted as a result of closure activities should be ripped and profiled. • Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all development including decommissioning phases to prevent loss of faunal habitat. • All project related disturbed habitat areas must be rehabilitated and planted with indigenous floral species as soon as possible to ensure that faunal habitat is reinstated. • A bi-annual alien vegetation clearance program should be implemented for up to 3 years after closure.

Environmental Aspect	Additional Mitigation Measures
	• It must be ensured that mining related waste or spillage and effluent do not affect the sensitive habitat boundaries and associated buffer zones after closure. • Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure.
Surface water	• Demolition activities will be undertaken during the dry season, where possible to minimise the potential for stormwater runoff. • During closure and rehabilitation activities, clean water diversion berms upstream of the area will be constructed. • Routine surface water quality monitoring up and down stream of closure and rehabilitation activities will be undertaken as per the surface water monitoring programme. • Maintain stormwater management systems.
Groundwater	• Implement a groundwater monitoring programme during the closure and rehabilitation phase. • Implement active remediation if impacted groundwater is contaminated and monitor for at least 2-3 years; • All mined areas should be flooded as soon as possible to bar oxygen from reacting with remaining pyrite; • The final backfilled opencast topography should be engineered such that runoff is directed away from the opencast areas; • The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencasts; • The drilling of boreholes into mining areas is recommended so that recovery of water in mining areas can be monitored.
Social	• The upskilling of workers to enhance re-employment opportunities following closure and decommissioning must be implemented well in advanced of the decommissioning phase; • Where possible, Golden Tropic must provide assessment and counselling services for affected individuals; • Establishment of clear criteria for socio-economic projects and corporate social investment activities, that incorporate partnerships, exist strategy and sustainability; • Adhere to the mine closure plan.

Closure of the mine will also have significant socio-economic impacts on the surrounding communities and the personnel who will be retrenched due to mine closure.

The impacts of the closure of the mine will be assessed in detail during the closure phase.

Table 13-6: Impact Assessment Table for the Decommissioning and Closure Phase

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Likelihood (Probability)					Consequence			Likelihood (Probability)			
		Severity	Spatial	Duration	Frequency: Activity	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Severity	Spatial	Duration	Frequency Activity	Frequency: Impact	Significance	Significance Rating
Socio-Economic	Downscaling and retrenchment • Loss of employment • Reduced regional economic development • Reduced community investment	1	2	4	4	3	49	Medium-High (-)	• Manage qualifications of mine workers and implement programmes in the SLP to enable workers to source employment elsewhere on decommissioning of the mine.	1	2	2	2	3	25	Low (-)
Surface water	Debris blocking watercourses if road continues to be used by the community.	1	2	4	4	3	49	Medium-High (-)	• Community needs to remove litter & debris to prevent blocking.	1	2	2	2	3	25	Low (-)
	Impeding flow while under demolition	3	2	2	1	3	28	Medium-Low (-)	• Demolish infrastructure as far as possible in the dry season	1	2	2	1	3	20	Low (-)
	Increased turbidity due to demolition.	3	2	1	2	4	36	Medium-Low (-)	• Demolish during dry season, limit the disturbed footprint.	1	2	2	1	3	20	Low (-)
	Accidental spillages of hazardous substances from construction vehicles used during demolition.	2	2	1	1	4	25	Medium-Low (-)	• Operate using best practices and clean spillages immediately they occur and remediate as necessary using spill kits.	1	2	1	2	4	24	Low (-)
Groundwater	Following mine closure and subsequent recovery (rebounding) of the local groundwater, the backfill material in the quarry will alter the local hydraulic properties	3	2	1	2	4	36	Medium-Low (-)	• Regularly monitor water levels in boreholes near the active mining area. • Regularly update and validate groundwater numerical model to ensure that the drawdown zone does not extend beyond managed/monitored areas. • Regularly monitor water levels in private boreholes and make alternative supply arrangements, if required. • Monitor surface features such as local rivers, streams and springs and implement augmentation, if required. • A procedure for the storage, handling and transport of different hazardous materials must be drawn up and strictly enforced; • Ensure vehicles and equipment are in good working order, and drivers and operators are trained; • Place oil traps under stationary machinery. Only re-fuel machines at fuelling stations. Construct structures to trap the oil spillages at the fuel stations. Immediately clean oil and fuel spills and dispose contaminated materials (soil) at license site only; • Sewage tanks and or infiltration pits must be rehabilitated and sealed; and • Ensure that good house-keeping rules are applied;	1	2	2	1	3	20	Low (-)
Visual	Removal of infrastructure and general decommissioning and closure activities leading to visual intrusion on sensitive receptors.	3	2	3	3	3	48	Medium-High (-)	• Decommissioning footprints and disturbed areas should be kept as small as possible and no further indigenous vegetation should be cleared or soils exposed for this purpose; • All areas where infrastructure is removed must be resloped to resemble the pre-development landscape and revegetated as soon as possible; • Concurrent/ progressive rehabilitation must be implemented, and disturbed areas must be rehabilitated as soon as possible and as soon as areas become available by replacing topsoil and revegetating disturbed areas; • Indigenous and locally occurring plant species selected for use in re-vegetation should be selected taken quick growth rates into consideration in order to cover bare areas and prevent soil erosion; and • Upon final rehabilitation, it must be aimed to remove all much surface infrastructure and to reshape the landscape to pre-development conditions.	2	1	2	2	2	20	Low (-)
Soils, Land use and Land Capability	Soil Compaction	2	3	3	3	2	40	Medium-High (-)	• Heavy machinery/mining equipment should stick to demarcated routes to avoid soil compacting; • 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 soils should be limited within demarcated areas where possible to minimise the intensity of compaction; and • Compacted soils adjacent to the mining quarry and associated infrastructure footprint can be lightly ripped to at least 25 cm below ground surface to alleviate compaction prior to re-vegetation.	2	2	2	4	2	36	Medium-Low (-)

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		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency Activity			
	Dust and Soil Erosion	3	2	2	3	3	42	Medium-High (-)	• Temporary erosion control measures may be used to protect the disturbed soils during the decommissioning and closure phase until adequate vegetation has established. • Restrict vegetation clearance to priority areas of development. • The footprint of the proposed mining and infrastructure areas should be clearly demarcated to restrict vegetation clearing activities within the infrastructure footprint as far as practically possible; • Bare soils can be regularly dampened with water to suppress dust during the decommissioning and closure phase, especially when strong wind conditions are predicted according to the local weather forecast;	2	1	2	1	2	15	Low (-)
	Soil Degradation	2	3	2	5	3	56	Medium-High (-)	• Excavation and long-term stockpiling of soil should be limited within the demarcated areas as far as practically possible; • Ensure all stockpiles are clearly and permanently demarcated and located in defined no-go areas; • Separate stripping, stockpiling and replacing of soil horizons in the original natural sequence to combat hard setting and compaction, and maintain soil fertility; • Stockpiles height should be restricted to that which can deposited without additional traversing by machinery. Maximum height of 2-3 m is proposed, and the stockpile should be treated with temporary soil stabilization; • Stockpiled soils should be stored for a maximum of 3-5 years. Alternatively, concurrent rehabilitation should strongly be considered to reduce the duration of stockpile storage to ensure that the quality of stored soil material does not deteriorate excessively; especially with regard to leaching and acidification • At decommissioning and rehabilitation phase, replace soil to appropriate soil depths in the correct order, and cover areas to mimic a natural topographic aspect so as to achieve a free draining landscape that is as close as possible the pre-mining land capability rating.	3	1	3	3	2	35	Medium-Low (-)
Biodiversity	Loss of floral SCC	2	1	2	2	2	20	Low (-)	• Floral SCC, if encountered within the decommissioning footprint areas, are to be handled with care and the relocation of sensitive plant species to suitable similar habitat is to be overseen by a botanist.	2	2	2	2	1	18	Low (-)
	Ineffective rehabilitation and monitoring of disturbed areas could lead to loss of floral species diversity	4	2	5	2	3	55	Medium-High (-)	• Concurrent/ progressive rehabilitation must always be implemented, and disturbed areas must be rehabilitated (ripped, scarified and re-vegetated with suitable indigenous grass species that will aid in soil stabilisation) as soon as possible. This will not only reduce the total disturbance footprint but will also reduce the overall rehabilitation effort and cost.	2	2	2	2	2	24	Low (-)
	Loss of floral habitat	3	2	5	2	3	50	Medium-High (-)	• It must be ensured that no additional natural areas are further impacted or cleared during the decommissioning/ closure phase of the project	2	2	2	2	2	24	Low (-)
	Alien vegetation	3	3	3	4	4	72	Medium-High (-)	• Ongoing monitoring and clearing of AIP species must take place during the decommissioning/ closure phase of the project	2	2	2	2	2	24	Low (-)
	Increase in erosion as a result of disturbance leading to loss of floral habitat	3	2	3	4	3	56	Medium-High (-)	• Ongoing management of edge effects such as erosion and alien vegetation control must take place, as well as control of soil contamination, as salinization of soils could severely affect habitat; • Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect floral habitat, need to be strictly managed in all areas of increased ecological sensitivity; • Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure.	2	2	2	2	2	24	Low (-)
	Ineffective rehabilitation may lead to permanent transformation of floral habitat	3	3	3	4	4	72	Medium-High (-)	• Rehabilitation of the disturbed areas is to be conducted during the operational phase to reintroduce indigenous vegetation where areas are available.	2	2	2	2	2	24	Low (-)
	Ongoing mining development and ineffective rehabilitation leading to cumulative loss of natural vegetation in the region	3	3	3	4	4	72	Medium-High (-)	• Minimise loss of indigenous vegetation where possible throughout the decommissioning and closure phase.	2	2	2	2	2	24	Low (-)
	Proliferation of alien and invasive floral species in disturbed areas may lead to altered vegetation communities.	3	3	3	4	4	72	Medium-High (-)	• A bi-annual alien vegetation clearance programme should be implemented for up to 2 years after closure.	2	2	2	2	1	18	Low (-)
	Ineffective rehabilitation may lead to permanent transformation of floral habitat	3	3	3	3	3	54	Medium-High (-)	• Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure	2	2	2	2	2	24	Low (-)
	Ongoing mining development and ineffective rehabilitation leading to cumulative loss of natural vegetation in the region	3	3	3	3	3	54	Medium-High (-)	• Minimise loss of indigenous vegetation where possible post- closure and ensure that rehabilitation is effectively implemented.	2	2	2	2	2	24	Low (-)

Environmental Aspect	Nature of potential impact/risk	Environmental Impact Significance Before Mitigation							Impact Management Actions (Proposed Mitigation Measures)	Environmental Impact Significance After Mitigation						
		Consequence			Likelihood (Probability)	Frequency: Impact	Significance	Significance Rating	Management and Mitigation Measures	Consequence			Likelihood (Probability)	Frequency: Impact	Significance	Significance Rating
		Severity	Spatial	Duration	Frequency: Activity					Severity	Spatial	Duration	Frequency Activity			
	Continued decrease in faunal habitat, species abundance and diversity	3	2	5	4	3	70	Medium-High (-)	• Manage edge effects from decommissioning and rehabilitation activities; and • Ensure that all disturbed areas are suitably revegetated with indigenous plant species.	2	2	2	2	2	24	Low (-)
	Alien plant proliferation in disturbed areas leading to loss of faunal habitat	3	2	5	2	3	50	Medium-High (-)	• Implement an alien and invasive plant control program and manage until suitable indigenous basal cover has been established.	2	2	2	2	2	24	Low (-)
	Fire hazards	3	3	2	2	3	40	Medium-High (-)	• Controlled fire burning regimes are to be conducted by a qualified fire management officer; and • Unplanned fires are to be strictly forbidden.	2	2	2	2	2	24	Low (-)
	Trapping of faunal species	3	2	3	3	3	48	Medium-High (-)	• Access control must be implemented to ensure that no illegal trapping or poaching takes place; and • Any individuals caught with poached faunal species should be prosecuted.	2	2	2	2	2	24	Low (-)
	Change in species diversity	3	3	3	3	3	54	Medium-High (-)	• Ensure a suitable rehabilitation plan is implemented and suitable indigenous habitat is re-established to support pre-mining faunal communities.	2	2	2	2	2	24	Low (-)
	Ongoing loss of faunal habitat and diversity in the MRA	3	2	4	3	3	54	Medium-High (-)	• Rehabilitate all faunal habitat areas to ensure that faunal ecology is re-instated during decommissioning and rehabilitation. • The rehabilitated habitat should aim to support pre- mining faunal communities.	2	2	2	2	2	24	Low (-)
	Reduced chance of faunal species recolonizing the disturbed areas	3	3	4	3	3	60	Medium-High (-)	• Rehabilitate all faunal habitat areas to ensure that faunal ecology is re-instated during and rehabilitation; and • The rehabilitated habitat should aim to support pre- mining faunal communities	2	2	2	2	2	24	Low (-)
	Ongoing mining development and ineffective rehabilitation leading to cumulative loss of faunal habitat and diversity in the region	3	3	5	3	3	66	Medium-High (-)	• Rehabilitate all faunal habitat areas to ensure that faunal ecology is re-instated during rehabilitation; and • The rehabilitated habitat should aim to support pre- mining faunal communities	2	2	2	2	2	24	Low (-)
	Proliferation of alien and invasive floral species in disturbed areas may lead to altered faunal habitat within the study area	4	3	5	3	3	72	Medium-High (-)	• A bi-annual alien vegetation clearance and monitoring programme should be implemented for up to 5 years after closure; and • Indigenous basal vegetation cover should be monitored, and it must be ensured that habitat availability post closure can support faunal communities identified pre-mining.	2	2	2	2	2	24	Low (-)
Waste Management	Potential water and soil pollution as a result of inappropriate waste management practices	2	3	2	2	2	28	Medium-Low (-)	• Implement the mitigation measures contained in the construction phase assessment.	2	2	2	1	2	18	Low (-)

14 Possible mitigation measures that could be applied and the level of risk

Refer to Section 13 for the mitigation measures that could be applied to reduce the level of risk due to the proposed mining project. It is anticipated that the management measures associated with the activities will be adequate to manage the impacts associated with the project as provided in Section 13 of this report.

15 Motivation where no alternatives were considered

The location of the proposed project components is constrained to the location of the existing and confirmed mineral resource (granite). Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology (Figure 8-1).

The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. As such, the site is therefore regarded as the preferred site and alternatives are not considered.

The infrastructure layout will be based on the location of sensitive environments such as heritage sites (graves etc.), aquatic ecosystems, riparian zones, and areas with Red Data Species.

16 Statement motivating the preferred site

The location of the proposed project components is constrained to the location of the existing and confirmed mineral resource (granite). Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology (Figure 8-1).

The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. As such, the site is therefore regarded as the preferred site and alternatives are not considered.

The infrastructure layout will be based on the location of sensitive environments such as heritage sites (graves etc.), aquatic ecosystems, riparian zones, and areas with Red Data Species.

17 Description of the process undertaken to identify, assess and rank the impact and risks the activity will have on the preferred site

In order to identify the potential impacts associated with the proposed mining activities, the following steps were undertaken:

- The stakeholder consultation process is currently being undertaken in a manner to be interactive, providing the landowners and identified stakeholders with an opportunity to provide input into the project. This is considered a key focus as the local residents have capabilities of providing site-specific information, which may not be available in desktop research material. Stakeholders were requested, as part of the notification letter, to provide their views on the project, and to state any potential concerns they may have. All comments and responses provide will be collated into the comments and responses table, which will be attached to the final EIA/EMPr Report and will also be incorporated into the final impact assessment.
- A detailed desktop study 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:
    - The South African National Biodiversity Institute (SANBI) Biodiversity Geographic Database LUDS System;
    - Department of Water and Sanitation information documents;
    - The Municipal Integrated Development Plan for the Municipality; and
    - The Spatial Development Framework for the District Municipality.
- Specialist studies were also undertaken for biodiversity, hydrogeology, surface water and heritage resources.

A quantitative impact assessment process was undertaken as described in Sections 12.The rating of the identified impacts was undertaken in a quantitative manner as provided in Section 13 (impact rating). The ratings were undertaken in a manner to calculate the significance of each of the impacts. The identification of management and mitigation measures was done based on the significance of the impacts and measures included are considered sufficient, appropriate and practical to protect the environment.

17.1 Assessment of each identified potentially significant impact and risk

All identified impacts can be mitigated to a low significance level. From the point of view of the environmental impact created, granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less

waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

A detailed assessment of all the identified potential impacts is provided in Section 13.

18 Summary of Specialist Reports

The recommendations from specialist studies are summarised in **Error! Not a valid bookmark self-reference.**.

Table 18-1: Summary of specialist reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
Heritage Resources Assessment	The proposed mining may be approved to proceed as planned under observation that project work does not extend beyond the surveyed site. If the already known sites cannot be protected, then they should be mitigated prior to approval of a mining right. Should any unmarked burials be exposed during mining, potential custodians must be trekked, consulted and relevant rescue/ relocation permits must be obtained from SAHRA and or Department of Health before any grave relocation can take place. Furthermore, a professional archaeologist must be retained to oversee the relocation process in accordance with the National Heritage Resources Act 25 of 1999. Should chance archaeological materials or human burial remains be exposed during subsurface construction work on any section of the proposed development laydown sites, work should cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective, where remedial action is warranted, is to minimize disruption in construction scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA regulations. Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMP, there are no other significant cultural heritage resources barriers to the proposed mining. The Heritage authority may approve the proposed mining right application to proceed as planned with special commendations to implement the recommendations here in made.	All recommendations have been included in the EIA Report	Section 13 Section 38

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	If during mining, operational or closure phases of this project, any person employed by the applicant, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the site manager. The Site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing ISS It is the responsibility of the applicant to protect the site from publicity (i.e., media) until a mutual agreement is reached. Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or collect such remains, whether of recent origin or not, without the endorsement by SAHRA The applicant is reminded that unavailability of archaeological materials (e.g., stone tools and graves, etc) and fossils does not mean they do not occur, archaeological material might be hidden underground, and as such the client is reminded to take precautions during mining. The footprint impact of the proposed mining activities should be kept to minimal to limit the possibility of encountering chance finds within the proposed development site. Overall, impacts to heritage resources are not considered to be significant for the project receiving environment. It is thus concluded that the project may be cleared to proceed as planned subject to the Heritage Authority ensuring that detailed heritage monitoring procedures are included in the project EMP for the construction phase, include chance archaeological finds mitigation procedure in the project EMP (See Appendix 1). The chance finds process will be implemented, when necessary, especially when archaeological materials and burials are encountered during subsurface construction activities.		

<table>
<tr><th>LIST OF STUDIES UNDERTAKEN</th><th>RECOMMENDATIONS OF SPECIALIST REPORTS</th><th>SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)</th><th>REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.</th></tr>
<tr><td></td><td>The findings of this report, with approval of the SAHRA, may be classified as accessible to any interested and affected parties within the limits of the laws.</td><td></td><td></td></tr>
<tr><td>Hydrogeology</td><td>All existing boreholes must be properly sealed at the surface to prevent surface pollution of the groundwater. This measure will also prevent bees from invading the boreholes.
The mine needs to obtain a WULA for abstracting groundwater.
Boreholes must be used at the rates recommended in table below.
Table 18-2: Recommended management of boreholes.
<table>
<tr><th rowspan="2">BH</th><th rowspan="2">Available Drawdown (m)</th><th rowspan="2">Recom. Pump intake (mbgl)</th><th rowspan="2">Max Pumping Water Level (mbgl)</th><th colspan="2">Recom. Pump Rate</th></tr>
<tr><th>L/s 10h/d</th><th>m3/d</th></tr>
<tr><td>P2 Cape Autumn</td><td>50</td><td>60</td><td>60</td><td>0.15</td><td>12.96</td></tr>
<tr><td>P3 HQ Pump</td><td></td><td></td><td></td><td>0.15</td><td>12.96</td></tr>
<tr><td>P4 Red Solar Pump</td><td>17</td><td>28</td><td>13.5</td><td>0.7</td><td>60.48</td></tr>
<tr><td>P6 Blue Pump</td><td>35</td><td>55</td><td>50</td><td>0.15</td><td>12.96</td></tr>
<tr><td>P9 Pink Pump 2</td><td></td><td></td><td></td><td>0.15</td><td>12.96</td></tr>
<tr><td>P10 Pink Pump</td><td>40</td><td>48</td><td>38</td><td>0.25</td><td>21.6</td></tr>
</table></td><td>All recommendations have been included in the EIA Report</td><td>Section 13
Section 38</td></tr>
</table>

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.

TOTAL				1.55	133.92	

All production boreholes must be equipped with functioning volume meters and allowance must be made for access to measure groundwater levels. For this purpose, Class 6 irrigation pipe can be attached to the rising pipes of the pump. This conduit pipe must be installed to approximately 1 m above the pump inlet and the bottom end must be partially blocked to guarantee that the probe of the water level depth meter cannot be lowered below this point, where it can be stuck.

Air release valves must be provided at topographical high areas at 20 m intervals to release air. This will ensure that small pumps can be used with success.

Water levels must be measured monthly at all the above mentioned 10 boreholes.

Simultaneously, abstracted volumes must be recorded at the production boreholes

Rainfall should be recorded daily at the site.

These data must be analyses by a qualified Hydrogeologist at least on an annual basis in order to identify red flag situations timeously and take the necessary preventative measures.

The following mitigation measures should be implemented during the different phases in order to limit the impact on groundwater resources.

During the operational phase, the following mitigation measures are desirable:

- Minimise waste water and fresh water usage by the appropriate engineering design and re-use/recycling for other purposes where possible.
- A storm water plan is important and should be implemented as soon as possible.

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	• A procedure for storage, handling and transport of different hazardous materials must be drawn up and strictly enforced. • Ensure vehicles and equipment are in good working order and drivers/operators are trained. • Place oil traps under stationary machinery. Only re-fuel machines at fuelling stations. Construct structures to trap the oil spillages at the fuel stations. Immediately clean oil and fuel spills and dispose contaminated materials (soil) at license site only. • Oil traps under stationary machinery. Only re-fuel machines at fuelling stations. Construction structures to trap fuel at fuel station. Immediately clean oil and fuel spills and dispose contaminated materials (soil etc) at licenced sites only. • A groundwater monitoring system must be implemented to monitor groundwater quality and water level. • Sewage tanks and or infiltration pits must be constructed far away from permeable formations and significant aquifer systems. The area at the accommodation facilities are regarded as suitable for those structures, based on the depth to groundwater level and relatively thick, sand cover; • Ensure that good house-keeping rules are applied; The following mitigation measures are required during decommission phase;		

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	• A procedure for the storage, handling and transport of different hazardous materials must be drawn up and strictly enforced; • Ensure vehicles and equipment are in good working order, and drivers and operators are trained; • Place oil traps under stationary machinery. Only re-fuel machines at fuelling stations. Construct structures to trap the oil spillages at the fuel stations. Immediately clean oil and fuel spills and dispose contaminated materials (soil) at license site only; • Sewage tanks and or infiltration pits must be rehabilitated and sealed; and • Ensure that good house-keeping rules are applied; The inner protection zone is an area of at least 50m x 50m, cantered on the actual boreholes. The following measures must be applied in this protection zone: • No quarry latrines, VIP'S, soak-away or septic tank tanks – to prevent effluent from percolating into the aquifer and boreholes; • No storage fuel, lubricants or other hazardous substances without a leak prove; • Production boreholes for domestic use must be equipped with a sanitary seal – to prevent contaminated surface water		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	and spilled fuel from percolating down the casing into the borehole; • The concrete collar around borehole casing must be at least 100 mm higher than the floor or surface level to prevent spilled fuel, water from leakages, wash water, etc to enter the borehole. • No ponding of surface water must be allowed, i.e. the area must be sloped for surface water to drain away from this zone; • Vegetation, other than trees and large bushes, should be maintained in this zone – NB Roots of bushes and trees growing near boreholes often grows into the borehole where they can cause considerable problems; • The boreholes and pumping equipment must be housed in a lockable pump house. For this purpose, a removable cage manufactured out of galvanised steel mesh and corrugated steel sheets is recommended. This cage, rather than a brick building, is recommended as it can be ready removed in case the boreholes is damaged or if it needs to be re-developed and clean; • The production boreholes, as well as other monitoring boreholes in the area, must be properly sealed to prevent entry of reptiles, insects, birds and small rodents;		

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.
	• The entire area should be properly fenced with a lockable gate to prevent unauthorised entry and exclude animals. The gate must be positioned and of such a type that allows easy vehicle access; and • A signboard must be erected on the gate warning people of the dangers and that unauthorised entry is not allowed. The outer protection zone should cover an area of at least 500 m x 500 m and the following measures should be applied within this zone: • No water-borne sewage, soak-away or new pit latrines; • No new stock watering points or pens; • No abattoirs and other hazardous industries such as workshop, metal plating factories petrol filling stations, etc; • No cemeteries or disposal of solid waste or sewage; • Existing quarry latrines and septic tanks with 100m of the borehole must be properly sealed; and • If possible, no new housing or industry developments should be allowed in this zone.		
Hydrology	Floodline delineation indicated that all mining activities will be located away from the floodline area. It is recommended that mine infrastructure be revised to ensure that such infrastructures are outside of the floodlines.	All recommendations have been included in the EIA Report	Section 13 Section 38
Biodiversity	When selecting alternatives, it recommended to select sites have been impacted if possible in order to minimise the footprint of the	When selecting alternatives, it recommended to select sites have been	Section 13

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	project. The pristine sites should be used as a last resort. This will help conserve the remaining vegetation, and thus maintain ecosystem services. Some of the sensitive species that can occur onsite may be affected by the proposed development (such as Euphorbia spinea and Galenia africana). These species are protected within South Africa under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development. If any of the plant Species of Special Concern such as the Marula tree are identified during clearing of vegetation for the mining area, they should be recorded with a GPS and reported so that a relocation strategy can be employed by a suitably qualified botanical specialist. Given that plant SSC are present in large numbers on site, it is highly likely that some of these species will be encountered. No plant SSC should be destroyed as a result of the proposed activity. A laminated brochure can be developed with photos and given to operators on site, all SSC can be marked with biodegradable tape and permits applied for. Large plants are to be replaced by three young plants, medium plants by two plants and small plants by similar size plants. A database should be set up to include the following: species, number of individuals, GPS co-ordinates, size, height, and whether they area multistemmed. Fauna and Flora monitoring is recommended. The following should be adhered to for the monitoring programme: Monitoring must take place annually. Monitoring must be completed by qualified specialists; Adaptive management must be applied; Monitoring during the wet season is essential; and Findings must be compared to previous years.	impacted if possible in order to minimise the footprint of the project. The pristine sites should be used as a last resort. This will help conserve the remaining vegetation, and thus maintain ecosystem services. Some of the sensitive species that can occur onsite may be affected by the proposed development (such as Euphorbia spinea and Galenia africana). These species are protected within South Africa under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development. If any of the plant Species of Special Concern such as the Marula tree are identified during clearing of vegetation for the mining area, they should be recorded with a GPS and reported so that a relocation strategy can be employed by a suitably qualified botanical specialist. Given that plant SSC are present in large numbers on site, it is highly likely that some of these species will be encountered. No plant SSC should be destroyed as a result of the proposed activity. A laminated brochure can be developed with photos and given to operators on site, all SSC can be marked with biodegradable tape and permits applied for. Large plants are to be replaced by three young plants, medium plants by two plants and small	Section 38

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	Considering the season which the field has been conducted, it is therefore, recommended that more data be gathered during the summer season.	plants by similar size plants. A database should be set up to include the following: species, number of individuals, GPS co-ordinates, size, height, and whether they area multistemmed. Fauna and Flora monitoring is recommended. The following should be adhered to for the monitoring programme: Monitoring must take place annually. Monitoring must be completed by qualified specialists; Adaptive management must be applied; Monitoring during the wet season is essential; and Findings must be compared to previous years. Considering the season which the field has been conducted, it is therefore, recommended that more data be gathered during the summer season.	

Attach copies of Specialist Reports as Appendix 9

19 Environmental Impact Statement

19.1 Summary of key findings

The impacts evident from the detailed impact assessment (Section 13) of the proposed project are both positive and negative in nature. The key positive and negative findings outlined below.

19.1.1 Key Positive Impacts After Mitigation

The main positive impacts identified for the project relate to socio-economic impacts that the construction and operation of proposed mine will have. The proposed mine will result in the mining activities at the proposed granite mine for 10 years. These impacts were determined to have a positive impact, either directly or through the spinoffs generated by the development and operation of the proposed project and associated infrastructure. These positive impacts are not listed per phase of the project, but as consolidated impacts during construction, operation and closure

In terms of local economy, there is the potential for multiple significant benefits to both local and regional businesses, as well as local employment opportunities. This would be highest during the construction phase, due to the requirement of contractor numbers (for services and materials). This has opportunities for both the formal and informal sectors, as smaller enterprises, including spaza shops, are likely to be established during the construction period to supply contractors and others with food and other amenities.

The assessment of the current economic state in the municipality, the profile of the zone of influence, and the project itself showed that the mine has created numerous positive impacts and is likely stimulating the local economy. The proposed mining activities will ensure that the LM and communities in the area benefit from the mine. The stimulation of the national economy will occur as a result of the investment into the mine. The subsequent benefits are employment creation, a rise in consumption levels, new business sales, and a contribution to GDP.

It is expected that the mine will continue to implement a policy allowing for preferential procurement for the local businesses and training of local Small, Medium and Micro-sized Enterprises (SMME) on procurement and business management.

The mine is expected to have a positive socio-economic benefit through employment of locals. Recruitment of labour will be guided by Golden Tropic's recruitment policies which are expected to promote the employment of local labour by the mine as well as by any appointed contractors. Golden Tropic will ensure that a transparent process of employment will be followed to limit opportunities for conflict that may arise.

The proposed mine will use recruitment to meet the targets as set forth in the SLP. A projected total of 88 employees are envisaged to be employed at the mine. Where specialist and skilled labour is recruited from outside the local boundaries due to the skills scarcity, local residents will benefit through on the job training, where possible.

The skills programmes to be applied during mining operations at mine are considered to be holistic, given that they cover qualification attainment, basic education provision, on the job training, etc. If implemented accordingly, the skills levels particularly of the local community will improve and thus enable employees to acquire future employment.

19.1.2 Key Negative Impacts After Mitigation

The assessment found that there are a number of negative impacts that are expected as a result of the proposed granite mine. The most significant impacts identified were on the biodiversity,

groundwater and surface water resources. From the point of view of the environmental impact created, granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

The biodiversity assessment found that the proposed mining infrastructure will negatively impact on the floral communities within the area. the proposed mining area falls in the Bushmanland Arid Grassland which is classified as Least threatened. According to the SANBI, the proposed site is classified as a Critical Biodiversity Area 2 and Ecological Support Area, this implies that the proposed site plays a role in meeting biodiversity targets for ecosystems, species and ecological processes as identified in a systematic biodiversity plan. The proposed site has suffered minor veld transformation because of historic mining activities; however it is still in a good ecological state. These sites were found to incorporate protected trees species that will need to be considered during the planning and construction phase of the proposed activities. They also provide ecosystem services for both fauna and flora onsite. In addition, some medicinal plants were found on the property including *Aloe greatheadii* used medicinally for the treatment of wounds, sores and burns and *Aloe marlothi* used by the Zulus for roundworm infestations and by other cultures for stomach problems and horse sickness. Some of the sensitive species that can occur onsite may be affected by the proposed development (such as *Euphorbia spinea* and *Galenia africana*). These species are protected under the National Forest Act (Act 84 of 1998) and therefore application for permits to remove them should be acquired from the relevant authority prior to commencement of the proposed development.

Other negative impacts identified include:

- Socio – Economic: Transportation of material to and from the study area will result in additional trucks and construction vehicles on the study area roads, which can cause damage to the road surface and increase the potential for accidents in the area. The influx of additional people looking for employment will result in impacts on the social dynamics in the area.
- Groundwater Impacts: Local spillages of hydrocarbons and chemicals used during the pre-construction and construction phase which may leach to groundwater. There is potential for leakages, spillages and percolation of groundwater contaminants from infrastructure including the waste management facilities, waste rock dump area and the residue stockpiles/deposits areas.
- Surface Water: Movement and use of vehicles and machinery as well as improper storage of hazardous substance may have Impacts on surface water and groundwater quality due to accidental spillages of hazardous substances. Contaminated dirty water runoff from the mining area to surrounding areas resulting in the impact on local surface water quality. The removal

or containment of dirty water will result in the removal of MAR from the catchment, as this runoff will now be considered dirty water and will need to be contained within the mining area.

- Air Quality Impacts: The movement of vehicles in the area will have an impact on ambient air quality as follows:
    - Possible increase in dust generation, PM_{10} and $PM_{2.5}$ as a result of bulk earthworks, operation of heavy machinery, and material movement.
    - Increase in carbon emissions and ambient air pollutants (NO_2 and SO_2) as a result of movement of vehicles and operation of machinery/equipment.
- Visual Impacts due to:
    - Visual intrusion as a result of the movement of machinery and the erection of contractor camps;
    - Scaring of the landscape as a result of the clearance of vegetation and preparation of the mine areas; and
    - Indirect visual impact due to dust generation as a result of the movement of vehicles and materials, to and from the site area.
- Noise Impacts: The use of vehicles and machinery during the construction phase may generate noise in the immediate vicinity. Mining activities will result in an increase in ambient noise levels as a result of the mining activities
- Soil, Land Use and Land Capability: The proposed project is expected to have impact on land capability which will generally be limited since there currently are other anthropogenic activities in the area. The soil has already been significantly altered by other activities and the potential of this land to be used for agriculture after rehabilitation is very limited. The granite mining areas will result in permanent loss of land capability and result in a permanent change in landuse of the footprints of the quarry areas. There is potential for chemical potential pollution of soils due to use of vehicles and machinery and storage of hazardous material at the mine. Other impacts include:
    - Clearing of vegetation and compaction of the construction footprint will result in the soils being particularly more vulnerable to soil erosion;
    - Loss of soil resource and utilisation as a result of the cleaning and topsoil stripping of the construction footprint;
    - As a result of construction activities, the land use will have altered from grazing and agriculture to that of construction for mining activities;
    - Handling and storage of building materials and different kinds of waste leading to soil sterilisation.
- Heritage Impacts: The heritage resource assessment found no heritage resources and areas of archaeological importance as provided in Section 10.10. It must however be noted that there is a possibility that some heritage resources, especially graves, may have been missed during the assessment. These heritage resources may not be relocated or destroyed without written approval from the SAHRA. Implementation of mitigation measures included in Section 13 will result in the reduction of the significance of the impact, if any, ion heritage resources.
- Palaeontology Impacts: Sealing-in or destruction of the fossils during earth moving activity. Implementation of the mitigation measures in the specialist studies report and Section 13 of this report will reduce the potential for loss of fossils.

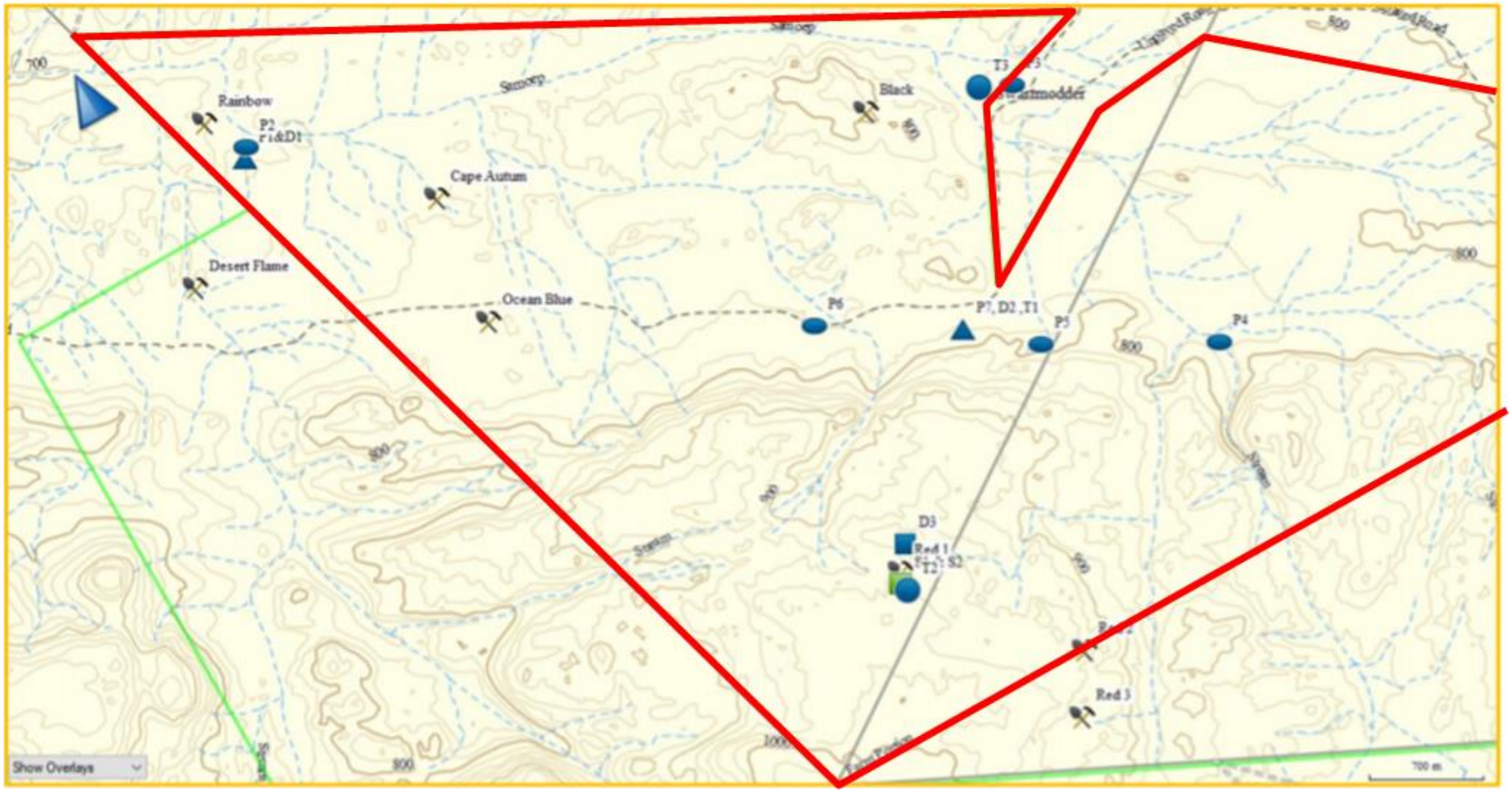
Closure and Decommissioning

The residual risk associated with the proposed project will largely relate to water management and rehabilitation following the operational phase. The rehabilitation of the mining area as well as the latent water influx will need to be managed to as to prevent any residual impact in years following decommissioning. These monitoring requirements have been addressed in the EMPr.

The main impacts that will result from the closure phase will relate to the ineffectiveness of the construction and operational phases to eradicate alien vegetation, which will ultimately result in the loss of indigenous fauna and flora. In addition, the decommissioning activities may further impact on the established vegetation in the area, resulting in the loss of biodiversity species, habitats and ecological structure. All the impacts that may result from the decommissioning activities of the proposed project have been effectively addressed in the impact assessment in Section 13.3, as well as the EMPr.

19.2 Final Site Map

No fatal flaws were identified for the proposed project through the stakeholder engagement process specialist studies and impact assessment by the EAP's team. As such it was not necessary to revise the layout plan for the proposed granite mining project. The site map is provided in **Error! Reference source not found.**.



GEOLOGICAL CONSULTING SERVICES PTY (LTD)

MINE DESGN MAP

Figure 19-1: Layout Plan

19.3 Summary of the positive and negative implications and risks of the proposed activity and alternatives

The positive and negative implications were assessed according to the construction, operational and decommissioning phases of the proposed project. A detailed description of the main impacts is provided in Section 13 and the main impacts are provided in Section 19.1. A short summary is provided below for each phase of the project.

19.3.1 Construction Phase

During the construction phase of the proposed project the majority of the negative impacts are associated with site clearance and vegetation removal activities. Topsoil loss should be limited by storing and protecting the topsoil to be used for rehabilitation purposes.

Vegetation clearance during construction will also result in loss of natural vegetation and disturbance to fauna on site. Site clearance and vegetation removal will also result in a loss in land capability. Natural vegetation removal is expected to have moderate significance impacts. The biodiversity assessment shows that there are some NFA protected trees and medicinal plants located in the project area which need to be protected through the use of mitigation measures in Section 13. Where required, permits for the relocation of these important species must be applied for prior to commencement of construction activities. Alteration of the sub catchment and increased sedimentation of surface water resources which may also impact aquatic biota may also occur due to the proposed granite mine. The implementation of mitigation measures such as commencing rehabilitation activities in tandem with or immediately following construction will however reduce the duration and significance of the impacts. The main negative implications associated with other general construction activities are nuisance noise, traffic, dust and visual impacts.

From a socio-economic perspective the development of the mine will have a positive impact on employment creation, economic and social upliftment and community development. An increase in employment opportunities, household income and skills development will contribute to a positive growth in the local and regional economy. Moderate negative social impacts are expected due to the impacts the proposed mine will have on agricultural activities (livestock and crop farming) and game farming in the area and surroundings.

19.3.2 Operational Phase

Blasting activities which may be required may have implications namely due to ground vibration and flyrock impacts at surrounding houses and roads. With the implementation of mitigation measures and proper blast designs these impacts can be reduced to be of minor negative significance.

Furthermore, the operation of surface infrastructure may lead to deterioration of water quality. Stormwater management measures will be in place to ensure clean and dirty water separate. Runoff emanating from surface infrastructure will be contained as far as possible; however, this in turn will result in the reduction in catchment yield. Topsoil loss has been identified as a potential impact of moderate significance during the operational phase as a result of rainwater runoff and wind erosion from roads and soil stockpiles. In addition, alien vegetation may establish on the topsoil. This can be prevented by planting indigenous grass mixture, which will also assist in erosion reduction.

Ineffective rehabilitation of construction areas will lead to proliferation of alien invasive plant species.

Similar to the construction phase, nuisance noise, dust and visual impacts of moderate negative significance are expected from general operation activities such as loading, hauling and stockpiling overburden and ROM. All of these impacts can be mitigated.

Employment creation during operation as well as stimulation and growth of the local, regional and national economies will be a continued and more positive social impact during the operational phase. Additionally, local SMME will indirectly benefit from the operational phase of the mine. The community will also benefit from community projects which should improve the well- being of the community. As with the construction phase, moderate negative social impacts are expected due to the impacts the proposed mine will have on agricultural activities (livestock and crop farming) and game farming in the area and surroundings.

19.3.3 Decommissioning Phase

During the decommissioning phase positive impacts will occur from rehabilitation activities including the restoration of land capability to its pre-mining state or agreed upon alternative, the restoration of vegetation and habitat types as well as the rehabilitation of infrastructure footprint areas.

The main expected negative impacts are associated with the movement of machinery to dismantle and remove equipment and infrastructure and rehabilitate the disturbed areas. Negative impacts resulting from soil loss, erosion and dust emissions were also identified. Moderate negative social impacts are expected when mining operations cease as a dependency on the mine for sustaining local economy would have been established.

Post closure monitoring is essential to determine if rehabilitation was successful and sustainable.

20 Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

The EMPr seeks to achieve a required end state and describes how activities that have, or could have, an adverse impact on the environment and surrounding communities will be mitigated, controlled and monitored.

The EMPr will address the environmental impacts and possible unplanned events during each phase of the Project (construction, operational, decommissioning and post-closure). Due regard must be given to environmental protection during the entire Project; a number of environmental recommendations are made to achieve environmental protection.

The objectives of impact mitigation and management are to:

- Primarily pre-empt impacts, assess their significance and implement appropriate mitigation and management measures to avoid, minimise and/or remediate the associated impacts where they cannot completely be avoided.
- Implement an adequate monitoring programme to:
    - Ensure that mitigation and management measure are effective.
    - Allow quick detection of potential impacts, which in turn will allow for quick response to issue/impacts.
    - Reduce duration of any potential negative impacts.

21 Final Proposed alternatives

21.1 Preferred Option

The choice of mining method in a dimension stone quarry is largely affected by the geology of the deposit. Boulder formations will largely be quarried by means of splitting methods, especially by means of the use of blasting gunpowder, while solid formations will require the at least some application of one or more cutting methods in order to loosen large benches from the solid formation. In general, in marbles, slates, sandstones and quartzites mining will be by non-explosive splitting and cutting techniques, while in granites blasting techniques may be applied. The physical properties of the stone are likely to determine what type of explosives will be applied.

Processing will involve cutting and dressing of the granite. There will be no processing taking place on site.

It must be noted that most of the required infrastructure exists already in the area which will require upgrading or expansion only. The infrastructure includes:

- Access roads: The mining right area is accessed via the N14 road from Kakamas to Springbok which intersects with a secondary road to Onseepkans Settlement. Access and haul roads in the mining area and to the plant have been created.
- Electricity: The mine currently makes use of power generators and Eskom electricity to supply power to the workshops, offices and sorting and dressing areas as well as other mining areas.
- Water: Mine process and potable water will be abstracted through boreholes and stored on site in 5 000 litre bottles, balancing dams, reservoir and storage dams at the quarries.

Other existing infrastructure in the mine area include:

- Quarries
- Living quarters
- Offices
- Workshops

The MR will be required for ten (10) years.

21.2 Alternative Option

The location of the proposed project components is constrained to the location of the existing and confirmed mineral resource (granite). Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. The proposed mining area is geologically located within the Bushmanland Group of the Namaqualand Metamorphic Complex which comprises of granitic gneiss as the majority lithology (Figure 8-1).

The granites in this area are considered to have potential as sources of dimension stone. They are also part of the Swartmodder Granite. The colours of the granite vary from terra-cotta red through pinkish to dark grey. Exploration work conducted on the proposed mining area included bulk sampling and some small-scale mining. These activities have led to the identification of granite deposits that are deemed feasible to mine. As such, the site is therefore regarded as the preferred site and alternatives are not considered.

22 Aspects for inclusion as conditions of Authorisation

The studies and impact assessment have been based on the proposed mine layout and mine works programme and other available information from the applicant. The management of the impacts identified for the construction, operation and closure phase is through a comprehensive range of programmes and plans contained in the EMPr. Implementation of these plans and programmes together with mitigation measures stipulate in the EMPr will be institutionalized through regular monitoring and auditing.

In order to achieve relative environmental management standards and ensure that the findings of the environmental assessment are implemented through practical measures, the recommendations and management measures from this EIA study are included within an EMPr.

The EMPr must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for the life cycle phases of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

In addition, the following key conditions should be included as part of the authorisation:

- No activities may be undertaken within 500 m of wetlands and/or within 100 m of watercourses without approval from the DWS;
- No removal and/or relocation of protected species, particularly *Euphorbia spinea* and *Galenia africana* may be undertaken without relevant permits.
- No removal and/or relocation of medicinal plant species including *Aloe greatheadii* and *Aloe marlothi* may be undertaken;
- No graves and/or cultural and palaeontological resources may be relocated and/or destroyed without relevant permits from SAHRA.
- The proponent is not exempted from complying with any other statutory requirements that is applicable to the undertaking of the activity. Relevant key legislation that must be complied with by the proponent includes inter alia:
    - Provisions of the National Environmental Management Waste Act (No. 59 of 2008);
    - Provisions of the National Water Act, 1998 (Act No 36 of 1998);
    - Provisions of the National Forests Act (Act No 84 of 1998); and
    - Provisions of the National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- The proponent must appoint a suitably experienced (independent) ECO for the construction phase of the development that will have the responsibility to ensure that the mitigation and rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPr;
- A Stormwater Management Plan must be compiled and must be adhered to;
- The EMPr must be enforced throughout the life of the project;
- Environmental audits reports must be submitted to the DMR on a monthly basis once construction has begun and on an annual basis during the operational phase. This is to ensure that mitigation measures are being implemented and to prevent environmental degradation (e.g. erosion) during the construction and operational phases.

23 Assumptions and limitations

Ndi Geological Consulting Services (Pty) Ltd has exercised all due care in reviewing the supplied information. Whilst Ndi Geological Consulting Services (Pty) Ltd has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data.

Opinions presented in this report apply to the information about the site and the project as it existed at the time of Ndi Geological Consulting Services (Pty) Ltd.'s investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which Ndi Geological Consulting Services (Pty) Ltd had no prior knowledge nor had the opportunity to evaluate.

All the data and information supplied to Ndi Geological Consulting Services (Pty) Ltd is assumed to be accurate and reflective of the current condition of the affected area. It is assumed that the baseline information reviewed and used to explain the environmental profile is accurate.

The public involvement process has been sufficiently effective in identifying the critical issues needing to be addressed in the EIA / EMPr by the EAP. The public involvement process has sought to involve key stakeholders and individual landowners.

Wherever possible the information requested, and comments raised by I&APs during the Initiation and Scoping Phases has been sufficiently addressed and incorporated into the EIA and EMPr that will be submitted to the DMR.

Ndi Geological Consulting Services (Pty) Ltd assumes that Golden Tropic will implement the measures contained in the EMPr and will adhere to any monitoring procedures. A monitoring and evaluation system, including auditing, will be established and operationalized to track the implementation of the EMPr ensuring that management measures are effective to avoid, minimize and mitigate impacts and that corrective action is being undertaken to address shortcomings and / or non-conformances. It is expected that Golden Tropic will comply with all legislation pertaining to the activities of this proposed project and that all permits and licenses that may be required will be identified and applied for prior to commencement of construction activities.

The following assumptions and limitation apply to the different specialist studies that were conducted for the proposed mine.

23.1 Biodiversity

The following assumptions and limitations are applicable to the floral assessment:

- The floral assessment is confined to the MRA and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment.
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral communities had been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management.
- Sampling by its nature means that not all individuals are assessed and identified. Some species and taxa within the MRA may, therefore, have been missed during the assessment. This is particularly relevant within arid regions where many floral species only respond to a good rain event, e.g. many bulbous plants only emerge and flower after sufficient rains.

The following assumptions and limitations are applicable to the faunal assessment:

- The faunal assessment is confined to the MRA and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management.
- Due to the nature and habits of most faunal taxa, the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary.
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the MRA may therefore have been missed during the assessment.

23.2 Heritage Resources Assessment

The investigation has been influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in establishing intangible heritage values. It should be noted that archaeological deposits (including graves and traces of archaeological heritage) usually occur below the ground level. Should artefacts or skeletal material be revealed at the site during mining, such activities should be halted immediately, and a competent heritage practitioner, SAHRA must be notified in order for an investigation and evaluation of the find(s) to take place (see NHRA (Act No. 25 of 1999), Section 36 (6). Recommendations contained in this document do not exempt the applicant from complying with any national, provincial, and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA. The author assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report.

The field survey did not include any form of subsurface inspection beyond the inspection of burrows, road cut sections, and the sections exposed by erosion. The study area covers a hill complex which in some cases was not accessible. The study team observed that the site might not have attracted sedentary human settlement although Orton & Webly (2013) identified a few scatters of lithic tools. Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information would apply. It should, however, be noted that these do not invalidate the findings of this study in any significant way:

- The proposed mining activities will be limited to specific right of site as detailed in the development layout.
- The mining team to provide link and access to the proposed site by using the existing access roads and there will be no construction beyond the demarcated site.
- No excavations or sampling were undertaken since a permit from heritage authorities is required to disturb a heritage resource. As such the results herein discussed are based on surficially observed indicators. However, these surface observations concentrated on exposed sections such as road cuts and clear farmland.
- This study did not include any ethnographic and oral historical studies, nor did it investigate the settlement history of the area.

24 Reasoned opinion as to whether the proposed activity should or should not be authorised

24.1 Reasons why the activity should be authorised or not

Granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements. No fatal flaws were identified by the specialists.

The findings of the impact assessment have shown that the proposed project will have medium-high and medium low impacts on the receiving environment, including:

- The loss of crop farming and grazing land (land use change);
- Reduction in catchment yields as dirty water runoff within the mine will be contained;
- Potential loss of SCC;
- Loss and fragmentation of habitat of faunal SCC and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;
- Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the mine; and
- Nuisance noise, dust and visual impacts.

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium-low to low significance, including:

- Stormwater management plan will be implemented throughout the LoM;
- The infrastructure will be designed so as to protect groundwater and surface water resources;
- Re-vegetation of the rehabilitated areas with indigenous species;
- Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project;

- Develop and implement a biodiversity management plan; and
- The land use and the overall land capability as the soil can be rehabilitated to be reused for crop farming, livestock grazing purposes and/or game farming.

Monitoring plans, which should be implemented throughout the LoM, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

With the correct and effective mitigation and management measures, including the protection of sensitive environments outside the footprints of the mining areas and infrastructure, the mining operations are feasible. Rehabilitation must be implemented based on best practice principles and the DMR, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed mine expansion.

24.2 Conditions that must be included in the authorisation

24.2.1 Specific conditions to be included into the compilation and approval of the EMPr

The following specific conditions are proposed:

- All mitigation measures in this report should be implemented;
- Where possible, Golden Tropic must revise the project layout plan to as much as possible avoid areas of conservation importance;
- Environmental monitoring should take place as recommended;
- All flora and fauna SCC must be relocated by a qualified specialist as part of a relocation and monitoring plan prior to construction activities. Where it is not possible to relocate SCC, required permits must be obtained;
- No faunal SCC may be poached during the construction or operational phase of the project;
- A grievance system or communication platform must be established to create a forum for the public to interact with the mining house;
- A WUL must be obtained prior to water uses being undertaken;
- The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts; and
- The closure cost assessment should be updated and submitted as per the legislative requirements.

24.2.2 Rehabilitation requirements

The post-mining land use should be restored to crop farming, livestock grazing purposes and/or game farming and should represent the pre-mining land use, as far as possible. The rehabilitation of the project will aim to:

- Ensure that the final elevation around the site is free draining.
- Ensure that soil is replaced in the same sequence to ensure soil characteristics are retained as far as possible.
- Ensure a self-sustaining post-mining land capability similar to pre-mining of crop farming, livestock grazing purposes and/or game farming.

- Ensure that the rehabilitated areas are cleared of all contaminating substances and that runoff from the area is returned to the natural catchment.
- Ensure that vegetation growth and cover on the rehabilitated areas is sustainable and local indigenous species are establishing on the site and that succession and colonisation from surrounding areas is taking place on rehabilitated areas. Ecological and ecosystem processes should function optimally after a prescribed period.
- Ensure that alien invasive species are eradicated until the closure certificate is granted.
- In order to ensure rehabilitation of the site can be undertaken responsibly, soils must be stripped and stockpiled separately. This will ensure preservation of soil for re-use in rehabilitation of the site.

The closure and rehabilitation objectives for the project are listed below, and should be met:

- Achieve a final land use that is sustainable and meets both legislative requirements and stakeholder needs;
- Maintain and monitor all rehabilitated areas following re-vegetation and, if this monitoring shows that the objectives have been met, make an application for closure;
- Comply with local, district and national regulatory requirements; and
- Follow a comprehensive consultation and communication process with all stakeholders.

The overall closure objectives for the proposed project are provided in Section 38.1.

25 Period for which the Environmental Authorisation is required

The EA/WML will be required for a period of 10 years.

26 Undertaking

We hereby confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme Report.

27 Financial Provision

27.1 The amount required to cover the rehabilitation is anticipated to be R 1 333 912.63 at this stage. A guarantee paid to DMR for a financial guarantee as required by the Environmental Management Programme will be amended every financial year.

27.2 Explain how the aforesaid amount was derived

The financial provision for the environmental rehabilitation and closure of any mine/prospecting and its associated operations forms an integral part of the MPRDA. Sections 41 (1) and, 41 (2), 41 (3) and 45 of the MPRDA deal with the financial provision for rehabilitation and closure. During 2012, the DMR made updated rate available for the calculation of the closure costs, where contractor's costs are not available, these apply.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the DMR in January 2005 in order to empower the personnel at Regional DMR offices to review the quantum determination for the rehabilitation and closure of mining/prospecting sites.

With the determination of the quantum for closure, it must be assumed that the infrastructure had no salvage value (clean closure). The closure cost estimate (clean closure) was determined in accordance with the DMR guidelines.

27.3 Confirm that this amount can be provided for from operating expenditure

Golden Tropic will fund the operation and hereby confirms that the amount is anticipated to be an operating cost and is provided for as such in the Mining Works Programme.

28 Deviations from the approved scoping report and plan of study

28.1 Deviations from the impact assessment methodology

There are no deviations from the impact assessment methodology that was submitted with the approved Scoping Report.

28.2 Motivation for the deviation

Not applicable.

29 Other information required by the Competent Authority

29.1 Impact on the socio-economic conditions of any directly affected person

The landowners will be directly affected by the mining activity as it will interfere with the current livestock farming and irrigated agricultural activities. The impacts that will affect the landowners include but not limited to:

- Loss of land capability where the granite mining will be undertaken;
- Loss of grazing and irrigated land for the directly affected property owners;
- Loss of land where the roads and infrastructure will be constructed;
- Increased noise and visual disturbances;
- Loss of indigenous vegetation and sensitive habitats; and
- Suffer losses due to increased criminal activity (poaching).

The financial losses due to the change in the land use will need to be compensated for by way of land use agreements with the property owners.

In order to mitigate specific risks of criminal activity to directly affected and neighbouring landowners, it is recommended that:

- Fence off servitudes and access roads and provide for strict access control measures to service roads and patrol service roads regularly;
- Utilize sufficient mine security to regularly patrol the fences of the mine infrastructure;
- Liaise with the South African Police Service to enhance police patrol activity in the project area;
- Implement the provisions made in the SLP in terms of recruitment policies and strategies, LED projects etc;
- Support the community watch of the directly affected and neighbouring landowners which can report criminal or suspicious activity; and
- Employment of local people on the mine to improve the poverty levels in the host and neighbouring communities.

29.2 Impact on any national estate referred to in Section 3 (2) of the National Heritage Resources Act

The heritage resources assessment undertaken for the project found that no graves and/or sites of archaeological importance will be affected by the mining project. It must however be noted that, given the nature of heritage assessments, there is a chance that there may have been heritage resources that were missed during the assessment.

The EIA has therefore included mitigation measures that must be implemented should any heritage resources be encountered during all phases of the project. Please refer to Section 13 of this report and the accompanying EMPr.

30 Other Matters required in terms of Sections 24 (4) (a) and (b) of the Act

Section 24(4)(b)(i) of the NEMA (as amended), provides that an investigation must be undertaken of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity.

Alternatives relating to site layout, infrastructure and operation activities were considered. The location of the proposed project is constrained to the location of the mineral resource, and proven reserve. Different technologies will be considered and will be determined by the shape, position and orientation of the mineral resource. This mining operation can be classified as quarrying the open or surface excavation of granite. Quarrying starts from the earth's surface and maintains exposure to the surface throughout the extraction period. For both access and safety, the excavation usually has stepped or benched side slopes. Quarrying methods depend mainly on the desired size and shape of the stone and its physical characteristics and the main equipment used are diamond saws (Rotary saws). An alternative would be wire saws.

Environmental Management Programme Report

31 Details of the EAP

31.1 Expertise of the EAP

31.1.1 Qualifications of the EAP

Please refer to Section 3.2.1.

31.1.2 Summary of EAPs past experience

Please refer to Section 3.2.2.

32 Description of the aspect of the activity

Please refer to Section 5 of this report.

33 Composite Map

The composite map is provided in

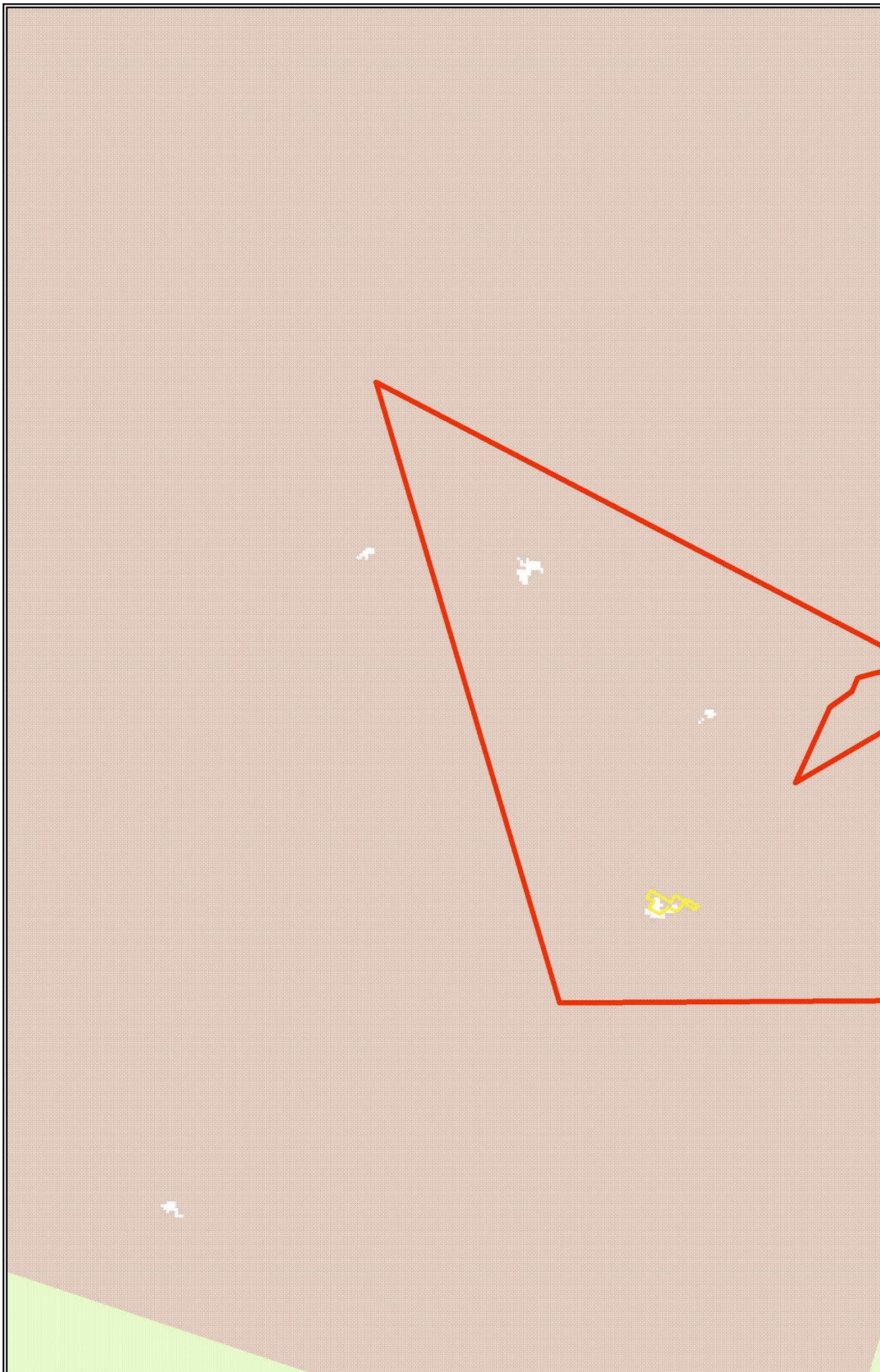


Figure 33-1 and attached as Appendix 7. No specific heritage sites have been identified and therefore have not been included in the preliminary composite map. The composite map will be updated once all the sensitive environmental sites have been identified. The current composite map includes red flag areas which include the following:

- Water courses and 100m regulated buffer area;
- CBAs; and
- Protected Areas.

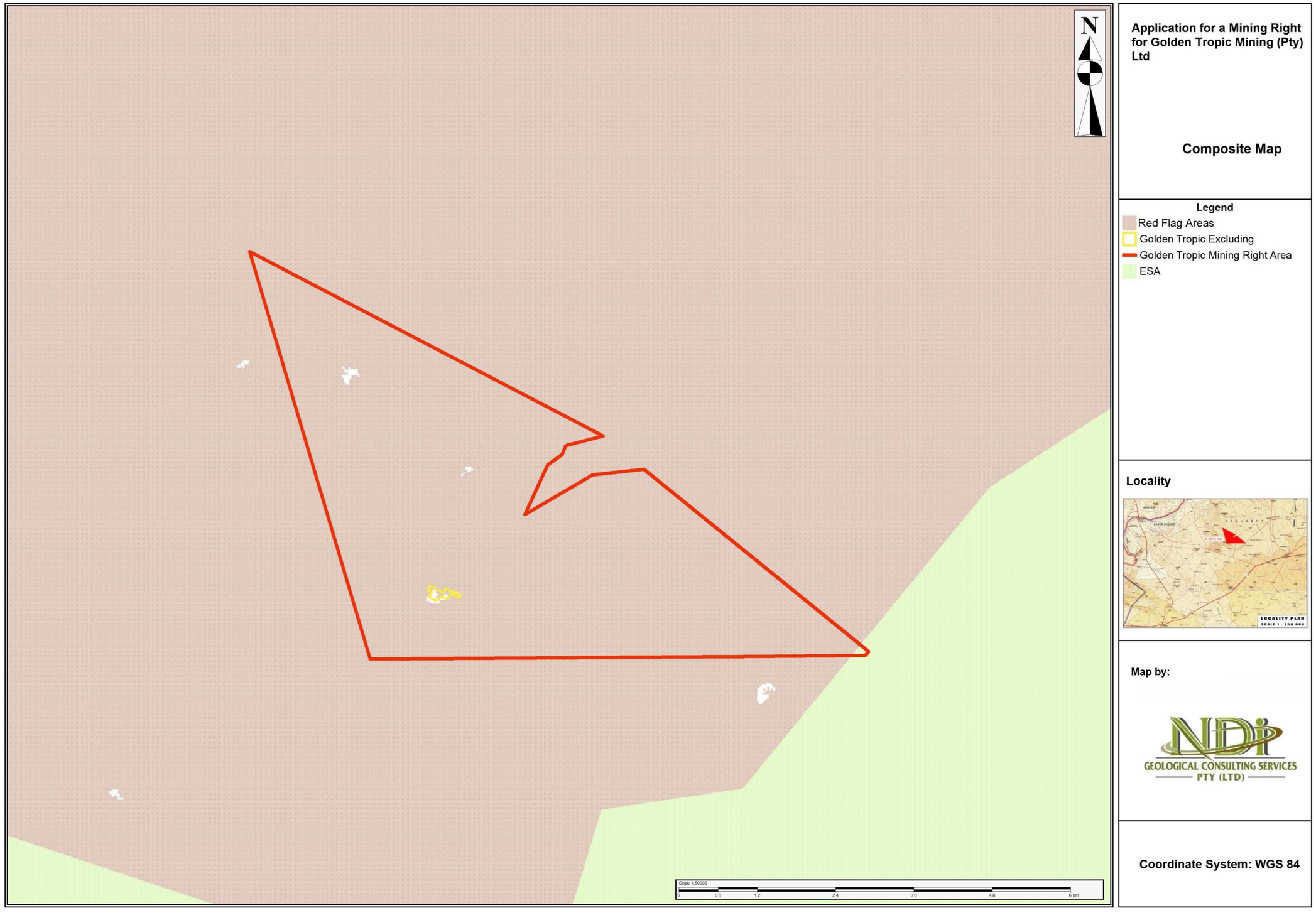


Figure 33-1: Composite Map

34 Description of impact management objectives including management statements

34.1 Determination of closure objectives

The main aim in developing mine's rehabilitation plan is to mitigate the impacts caused by the mining activities and to restore land back to a satisfactory end land use. The rehabilitation plan must be developed as early as possible and maintained throughout the life of operation. It is important that the project's closure plan is clearly defined and understood by all involved before starting the process and is complementary to the rehabilitation objectives. The closure vision for the granite mining project is intended to inform the closure objectives and as such is currently stated as:

To implement a post mining landscape that is safe, stable and non-polluting over the long term, through collaboration with affected stakeholders

The overall closure objectives for the proposed project are as follows:

- Return land, mined, as far as possible to a land capable similar to that which existed prior to mining in consultation with the surrounding land uses;
- Ensure that as little water as possible seeps out of the various sections of the mine and where this is unavoidable, ensure that the water is contained or treated if the volume is significant and if it does not meet statutory water quality requirements;
- Remove mine infrastructure that cannot be used by a subsequent landowner or a third party.
- Where buildings can be used by a third party, arrangements will be made to ensure their long-term sustainable use;
- Clean up all stockpiles and loading areas and rehabilitate these as far as possible to a land capability similar to that which existed prior to mining;
- Rehabilitate the disturbed land to a state that facilitates compliance with applicable environmental quality objectives,
- Landscape the rehabilitated areas in alignment with the surrounding topography to prevent the unnecessary pooling of water which will reduce the runoff in the catchment;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible, reducing the overall visual impact;
- Physically and chemically stabilise any remaining structures to minimise residual risks;
- Leave a safe and stable environment for both humans and animals;
- To limit soil and surface/groundwater contamination by managing all water on site;
- Comply with local and national regulatory requirements;
- Form active partnerships with local communities to take care of management of the land after mining, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation and, if monitoring shows that the objectives have been met, making an application for closure.

Successful rehabilitation must be monitored to ensure sustainability. This requires an understanding of the basic baseline environment, as well as project management to ensure that the rehabilitation program is a success.

34.2 The process of managing environmental impacts

All the identified impacts shall be mitigated as provided in Section 13 of this report. An Environmental Response Plan (ERP) is a process to respond rapidly and effectively to and manage emergency situations that may arise at the mine. The Emergency Preparedness and Response Code of Practice will be compiled in accordance with the following legislation:

- OHSAS 18001; and
- The MHSA.

In the event of an emergency, the ERP and applicable Procedure will be consulted, and the required actions implemented. To facilitate the effective implementation of the procedures, copies of the Emergency Response Plan will be placed in accessible and visible locations around the site, such as the site office and contractors' yards.

Golden Tropic shall ensure that employees and contractors are adequately trained regarding the implementation of the EMPr, environmental legal requirements and obligations, and the ERP.

Environmental awareness is applicable to all personnel involved in the project including part time personnel who shall be trained so that they are aware of environmental obligations by the time they access the site. An Environmental Control Officer (ECO) will be appointed to conduct training during site establishment and will be responsible for how the site will look like before the commencement of mining activities and how it looks like after rehabilitation. This will be to ensure that the site has been restored to its original state or to an acceptable level, and ensure the ERP is adequately applied in case of an emergency. Accordingly, training programmes and frequent emergency simulations is suggested to ensure that all personnel are aware of safety and emergency procedures.

In addition, a list of emergency contact numbers will be displayed at various locations around the site. If the emergency has the potential to affect surrounding communities, the communities will be alerted via alarm signals or contacted in person.

Personnel that do not comply or ignore training and instruction regarding this, should be fined based on their offensive. First time offenders may only get away with a written warning, depending on the seriousness of the offence. Second time offenders may be suspended or fined depending on the decision made by the site manager who may consult with the ECO, contractor and Safety, Health and Quality Officer of the mine.

34.3 Potential risk of Acid Mine Drainage

The potential risk for acid mine drainage was not determined as the proposed granite mining activities are not expected to be associate with any acid-producing wastes. Therefore, the proposed activities do not pose any potential risk of acid mine drainage.

34.4 Steps taken to investigate, assess and evaluate the impact of Acid Mine Drainage

Not applicable.

34.5 Measures to be put in place to remedy any residual or cumulative impacts from acid mine drainage

Not applicable.

34.6 Volume and rate of water use required for the mining operation

The proposed project will require 22 265 m^3/a or 61 m^3/d which will be abstracted from groundwater. The mean groundwater on the specific proposed development portion is estimated to be in the order of 0.5 mm/a or 0.5% of MAP or 479.16 m^3/d as a maximum level. The groundwater recharge volume of 479 m^3/d or 05.55 l/s for 12 h/d is more than the water demand for the project.

34.7 Has a water use licence been applied for?

A water use licence application will be submitted to the DWS for the abstraction of water. Furthermore, it is anticipated that a Section 21 (c) and (i) WUL may be required for any activities and/or infrastructure located within the 100-year floodlines.

34.8 Impacts to be mitigated in their respective phases

The full impact assessment with associated mitigation and management measures are presented in Section 13 as well as in Section 14.

35 Impact Management Outcomes

Table 35-1: Impact Management During the Pre-Construction and Construction Phase Mitigation Type

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Project Kick Off and Planning		Social	Pre-Construction	• This EMPr must form part of the contractual agreements with the specific contractors.	Control potential deviations from the approved EMPr.	Ensure contractors are aware of the required management measures stipulated in the EMPr.	Condition of the EMPr are met
Project Kick Off and Planning		Social	Pre-Construction, Construction and Decommissioning	• The contractor is expected to have safety "toolbox" talks in accordance with the risks and trends associated with the project. Proof of these talks shall be kept on site.	Control potential deviations from the approved EMPr.	Ensure all construction staff is familiar with the Environmental Awareness Plan.	Environmental Awareness is promoted
Project Kick Off and Planning		Social	Pre-Construction	• The contractor will develop a specific emergency procedure and plan.	Control potential deviations from the approved EMPr.	Ensure that all staff is familiar with the emergency procedure and plan.	Environmental Awareness is promoted
Site Establishment and site clearance for the construction of infrastructure: • Upgrade existing accommodation and office precincts and structures of less than 5ha; • Vegetation Clearance for site establishment and infrastructure including dressing areas, dispatch yards accommodation and logistics areas and areas for compressors and generators greater than 20ha • Upgrade or construct new workshop approximately ±0.5ha • Hydrocarbon storage less than 30m³ • Establishment of Waste Rock Dump ±3.5ha • Residue Stockpiles/Deposits >0.5ha • Waste Management Facilities >0.5ha • Construction, expansion or decommissioning of waste management facilities and associated structures and infrastructure >0.5ha • Stockpiling of topsoil >0.05ha	Groundwater and Surface water contamination	Groundwater and surface water	Pre-Construction and Construction	• No site establishment shall be permitted within sensitive landscapes; • Avoid stripping of areas outside the construction sites and rehabilitate areas that may have been mistakenly stripped; • Proper waste management facilities will be put in place at the campsite and construction sites. • Any hydrocarbon spill from the site establishment will be remediated as soon as possible; • No washing of vehicles shall be allowed outside demarcated areas. Washing bays for vehicles and other equipment shall be provided with appropriate soakaways, will be clearly demarcated and will not be allowed to contaminate any surface runoff; • Sufficient areas shall be provided for the maintenance and washing of vehicles; • Refuelling of vehicles will only be allowed in designated areas; • All construction equipment shall be parked in a demarcated area Drip trays shall be used when equipment is used for some time; • On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the material; • Bunded areas shall contain 110% of the stored volume; • Bund areas must be impermeable; • Bund area must have a facility such as a valve/sump to drain or remove clean stormwater, • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Contaminated water shall be pumped into a container for removal by an approved service provider; • Regular inspections shall be carried out to ensure the integrity of the bundwalls; • All preventative servicing of earth moving equipment and construction vehicles shall conducted off site; • Runoff from this area shall be contained; and	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Implementation of the mitigation measures will ensure that the quality of streams and groundwater within the site will comply with the DWS target water quality objective and construction will be in compliance with the regulations under the GN704. Golden Tropic will be required to obtain all necessary authorisations in terms of Section 21 of the National Water Act (No.36 of 1998) where specific targets will be set to ensure the protection of water resources in the area	Impact on ground and surface water quality avoided/minimised

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Spill kits shall be made available and all personnel shall be trained, and training records shall be made available on request.			
	Contamination of surface water resources (Samoep River, tributaries and drainage lines)	Surface water resources (drainage lines, rivers and wetlands)	Pre-Construction and Construction	• Where possible construction activities must be conducted in the dry season; • Silt bunds shall be used to trap; • The footprint area of all proposed infrastructure should be limited to what is necessary. • Disturbance to the surrounding natural habitat should be kept to a minimal; • It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, is placed outside of sensitive habitat units such as wetlands; • Ensure that topsoil is properly stored, away from the wetlands, streams and drainage areas; • Vehicle and personnel movement within watercourses and wetland areas shall be strictly prohibited; • Adequate stormwater management must be incorporated into the design of the project in order to prevent contamination of water courses and wetlands from dirty water. • Refuelling areas will be bunded and nozzles protected from spillage during refuelling; • Vehicular access to the stream will be restricted; • All spillages will need to be cleaned up as soon as practically possible; • Proper management of stormwater drainage infrastructure should be ensured; • Hazardous substances stored on site will be stored within a designated bunded areas fitted with a sump and value. Collection of water within the bunded areas will be deemed hazardous and disposed of as such; • Bunded areas will be watertight and inspected for leaks on a frequent basis; • Leaks to the bunded areas will be rectified as soon as possible; • Drip trays will be utilised for the collection of leaks from vehicles and machinery parked for long period of time; • Should a spill occur, this will be handled at the source of the leak and prevented from transpiring to nearby watercourse; • Ensure that routine maintenance on all vehicles is undertaken as per maintenance schedule and records are kept; • Sewage spillages shall be treated as hazardous waste and will be handled as such.; • Where necessary, and as defined when the final detailed project design is confirmed, construct sediment collection paddocks downstream of the working activities to minimise uncontrolled runoff from the site; • Minimise the areas that are to be stripped of vegetation; • Adequate storm water management should be considered in the detailed design of the proposed infrastructure in order to minimize undue erosion; • Erosion can also be limited by ensuring that mine vehicles and human movement is limited to project specific dedicated access ways;	Monitoring through rehabilitation and management of spills Rehabilitate contaminated areas	Implementation of the mitigation measures will ensure that the quality of streams and groundwater within the site will comply with the target DWS target water quality objective and construction will be in compliance with the regulations under the GN704.	Surface water quality Impact avoided/minimised

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Stormwater culverts and clean water diversions will be designed and constructed to accommodate the 1:50 year storm event around the mining areas; • Stormwater runoff will be directed towards natural watercourses; • Construction will be undertaken during the dry season, where possible, to minimise the potential for stormwater runoff; and • Routine surface water quality monitoring up and down stream of construction activities and position of infrastructure and activities associated with the Project will be undertaken on a monthly basis.			
	Loss of Species of Conservation Concern	Biodiversity	Pre-Construction and Construction	• Prior to the commencement of construction activities that the entire construction servitude, including lay down areas and stockpile areas etc., must be fenced off and clearly demarcated, including no-go zones such as wetlands located outside the area affected by the project; • Prior to the commencement of construction activities on site an alien vegetation management plan should be compiled for implementation throughout the construction and operational phases; • Prior to the commencement of construction activities on site a rehabilitation plan should be developed for implementation throughout the development phases • No stripping of topsoil and vegetation will be allowed during site establishment; • Any area that may result into the disturbance of the vegetation cover must be rehabilitated immediately on discovery; • Cutting down, relocation or disturbance of floral SCC not affected by the project shall be strictly forbidden; • The floral SCC are to be handled with care and the relocation of sensitive plant species to suitable similar habitat is to be overseen by a botanist; • The proposed development footprint shall be kept to the minimum; • Where possible disturbed areas must be concurrently rehabilitated during construction; • Prohibit the collection of any plant material for firewood or medicinal purposes; • The existing integrity of flora surrounding the study area shall be upheld and no activities shall be carried out outside the footprint of the construction areas; • Edge effect control shall be implemented to avoid further habitat degradation outside of the proposed footprint area; • Protected floral species occurring within the vicinity of the study area, but outside the disturbance footprint shall be fenced for the duration of the construction activities; • Construction vehicles shall only be allowed on designated roadways and access roads to limit the ecological footprint of the project; • Edge effects of activities including erosion and alien/ weed control will be strictly managed in the affected areas; • All sites disturbed by construction activities shall be monitored for colonisation by exotic or invasive plants;	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	The implementation of mitigation measures will ensure that the establishment of the construction site and associated infrastructure/equipment do not have detrimental impact on the area's flora, in particular indigenous species and species that are of conservation importance.	Rehabilitation standards and flora SCC are protected No Alien Invasive Plant Species in the area

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• An alien invasive plant special management and control program must be developed and implemented within all disturbed areas; • A bi-annual alien vegetation clearance programme should be implemented during the construction phase in order to prevent the establishment of alien and invasive plants; • A rehabilitation plan shall be developed for implementation throughout the development phases; and • Exotic or invasive plants shall be controlled as they emerge.			
	Migration of animal life due to disturbance caused proposed project:	Biodiversity	Pre-Construction and Construction	• The proposed development footprint areas shall remain as small as possible and where possible be confined to already disturbed areas; • Site activities will be conducted during daytime hours 07h00 – 17h30 to avoid night-time noise disturbances and night-time collisions with fauna; • Vehicle speed will be reduced, particularly in highly vegetated areas to avoid deaths by vehicle impacts; • No trapping or hunting of fauna is shall be permitted; • Uncontrolled and unauthorised fire shall be strictly prohibited; • Where a burning regime is implemented, this should be overseen by a qualified and experienced professional; • The mining and construction personnel should be informed about fire control and prevention measures to reduce the frequency of uncontrolled veld fires in areas surrounding and within the project area; • A fire management plan shall be developed and implemented in case of unplanned fire • Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed; • Should any faunal SCC be encountered within the study area, these species will be relocated to similar habitat within or in the vicinity of the study area with the assistance of a suitably qualified specialist; • No informal fires in the vicinity of construction areas shall be permitted; • An alien vegetation control plan must be developed and implemented in order to manage alien plant species occurring within the study area, and to prevent further faunal habitat loss; and • Poaching will be prohibited.	Relocation of affected species of conservation importance Management of site activities	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Rehabilitation standards and fauna habitats are protected
	Mortality and disturbance of fauna	Biodiversity	Pre-Construction and Construction	<u>Death/injury during vegetation clearing and earth works</u> • An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor for, and manage, any wildlife-human interactions. The ECO should be trained in inter alia, snake handling; and • As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas, such as open trenches and voids. <u>Vehicle-wildlife collisions</u> • Road signage indicating the potential presence and movement of wildlife should be installed within the construction footprints and along public roads.	Management of site activities	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Rehabilitation standards and fauna SCC are protected

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				Hunting, snaring and poisoning • The handling, poisoning and killing of on-site fauna by mine and construction workers and contractors must be strictly prohibited; and • Employees and contractors should be made aware of the presence of, and rules regarding, fauna through suitable induction training and on-site signage. Noise, vibrations and lights (sensory disturbances) • General noise abatement equipment should be fitted to machinery and vehicles; • As required, noise shields, including earth berms, should be constructed around sites of noise origin; • Dust suppression using water bowsers/sprayers should be undertaken on all sites/facilities where dust entrainment occurs; and • Plan the lighting requirements of facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. Possible options include: o Zoning of areas of high and low lighting requirements; o Movement activated lights as opposed to permanent lights; and o Reducing height and angle of lights.			
	Loss of soils, erosion of the soils and impacts on landowner's livelihood	Soils, landuse and Land Capability	Pre-Construction and Construction	• A spill prevention and emergency spill response plan shall be compiled to guide the construction works; • An emergency response contingency plan shall be put in place to address clean-up measures should a spill and/or a leak occur. • No soil stripping will be allowed during site establishment; • Should it be necessary to conduct geophysical surveys and geological mapping, ensure minimal disturbance of soil; • Any activity that may result in the disturbance of the soils must be rehabilitated immediately on discovery; • Access roads should be designed with a camber to avoid ponding and to encourage drainage to side drains; where necessary, culverts should be installed to permit free drainage of existing water courses; • Losses of fuel and lubricants from the oil sumps and steering racks of vehicles and equipment shall be contained using a drip tray filled with absorbent material; • Any hydrocarbon spill from the site establishment will be remediated as soon as possible; • Contaminated soil shall be removed and disposed of to an appropriate licensed landfill site in terms of NEM: WA, or can be removed by a service provider that is qualified to clean the soil; • The time in which soils are exposed during construction activities should remain as short as possible; • Erosion control measures shall be implemented where deemed necessary; • In general, all steep slopes steeper than 1:3 or where the soils are more prone to erosion must be stabilised; • Institute adequate sedimentation control measures where necessary when excavation or disturbance of the riverbanks takes place;	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Implementation of mitigation measures will ensure that the activities in the development of the construction sites and associated infrastructure do not have detrimental impacts on the soils, land use and land capability.	Rehabilitation standards, end use objectives

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• The time in which soils are exposed during construction activities shall be kept to a minimum; • If stockpiles are not going to be used immediately the stockpiles shall be rehabilitated to prevent erosion and resulting in the increase in turbidity; • Runoff from stockpiles shall be detained in order to support growth of vegetation; • Minimise stockpile height to <3m. • Topsoil should never be used as a filling material for roads • Soil stockpiles must be sampled, ameliorated (if necessary) and re-vegetated as soon after construction as possible. • Runoff from the stockpiles shall be suitably managed to ensure that the runoff volumes and velocities are similar to pre disturbed levels; • Separate stripping, stockpiling and replacing of soil horizons in the original natural sequence to combat hard setting and compaction, and maintain soil fertility; • Stockpiles height should be restricted to that which can deposited without additional traversing by machinery; • Maximum height vegetation shall be used to promote infiltration of water into the stockpile instead of increasing runoff; • A monitoring programme will be implemented if the stockpiles are not used within the first year whereby the vegetation of the stockpiles is monitored in terms of basal cover and species diversity; • If it is noticed that the vegetation on the stockpiles is not sustainable, appropriate corrective actions shall be taken to rectify the situation; and • Stockpiles shall be maintained until the topsoil is required for rehabilitation purposes			
Transportation of material and movement of vehicles and machinery on construction areas	Possible increase in nuisance dust and carbon emissions and ambient air pollutants (NO_2 and SO_2) due to movement of vehicles and operation of machinery and equipment	Air Quality	Pre-Construction and Construction	• Use dust suppression techniques such as wet suppression or chemical suppression (must be environmentally friendly and non-polluting) to reduce dust on roads that exhibit an increase of dust emitted from the entrainment of dust. • Dust suppression measures shall be implemented on dry weather days and periods of high wind velocities; • Rehabilitation of disturbed areas shall be undertaken in tandem with construction activities; • Limit load size to reduce spillage and cover final product loads with tarpaulins where needed. • Attend to dust control when loading trucks by minimising drop heights and prevention of over loading. • A routine emissions and ambient air quality monitoring program shall be developed and implemented to determine whether there are any significant increases in emissions and impacts at sensitive receptors. • A speed limit of 40 km/hr shall apply to limit vehicle entrained dust from the unpaved roads; • All construction equipment must be scheduled for preventative maintenance to ensure the functioning of the exhaust systems to reduce excessive emissions and limit air pollution;	Dust control measures Dust fallout monitoring	With the implementation of the mitigation measures, the construction will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Dust and Particulate Matter levels

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Design road alignments to minimise travel distances and eliminate unnecessary traffic • Appropriate dust suppression measures may include limiting the extent of open areas, reducing the frequency of disturbance and spraying with water; and • A routine emissions and ambient air quality monitoring program shall be developed and implemented to determine whether there are any significant increases in emissions and impacts at sensitive receptors. <u>Odours:</u> • Putrescible waste must be handled, stored and disposed of before the probability of it generating odours; • Chemical toilets must be emptied / serviced on a regular basis. Proof of this must be provided to the Engineer; • All the construction vehicles shall undergo maintenance on a regular basis to improve on the combustion engine vehicle efficiency; and • Traffic will be restricted to demarcated areas and traffic volumes and speeds within the construction site will be controlled;			
Vegetation clearance and excavation of construction sites	Visual intrusion as a result of movement of machinery and erecting of contractor camps as well as clearance of vegetation	Visual	Pre-Construction and Construction	• The relevant exposed construction site areas and access gravel roads will be irrigated on a regular basis, with just enough moisture to keep the dust down without creating undue runoff; • Natural vegetation, wherever practical, must be retained on and around the construction sites; • All lights used for illumination (except for lighting associated with security) should be faced inwards and shielded to avoid light escaping above the horizon; • Construction site will be screened from sensitive receptors and rubble removed from site on a daily basis; • Litter and dust management measures should be in place at all times; • Maintain the construction site in a neat and orderly condition at all times; • Create designated areas for material storage, waste sorting and temporary storage, batching and other potentially intrusive activities; • Limit the physical extents of areas cleared for material laydown, vehicle parking and the like as much as possible and rehabilitate these as soon as is feasible; • Repair unsightly and ecologically detrimental erosion damage to steep or bare slopes as soon as possible and re-vegetate these areas using a suitable mix of indigenous plant species. • To reduce the visual intrusion of the buildings, roofing and cladding material should not be white or shiny (e.g. bare galvanised steel that causes glare); • Construct and/or paint offices and workshop buildings in colours that are complementary to the surrounding landscape, such as olive green, light grey, grey green, blue grey, dark buff, rust, ochre variations of tan; • Utilise construction materials that have matt textures where possible; and • On site construction activities will be limited to be undertaken between 6am and 6pm.	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Measures will be undertaken to ensure that the visual aspects from the site are complying with the relevant visual standards and objectives and ensure that all operations during the construction phase do not result in detrimental visual impacts on surrounding properties, communities and road users.	Rehabilitation standards Traffic impacts reduced

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Transportation of material and movement of vehicles and machinery on construction areas	Increase in ambient noise levels due to movement of vehicles and machinery	Noise	Pre-Construction and Construction/Operation	• Conduct baseline noise monitoring prior to construction activities; • Implement a noise monitoring programme to measure against the baseline noise assessment; • The maximum speed limit shall be limited to 40 km/hr subject to risk assessment; • Less noisy equipment will be used, the equipment will be kept in good working order and the equipment will be fitted with correct and appropriate noise abatement measures; • Ensure that the employees are issued with earplugs and that they are instructed to use them; • Educate employees on the dangers of hearing loss due to mine machinery noise; • Adjacent landowners must be advised of any work that will take place outside of normal working hours, that may be disruptive (e.g. noise) in advance; • Surrounding communities must be notified in advance of noisy construction activities; • All equipment should be provided with standard mufflers; • Muffling units on vehicles and equipment must be kept in good working order; • Construction staff working in areas where the 8-hour ambient noise levels exceed 85 Dba should wear ear protection equipment; • Where possible, operation of several equipment and machinery must be avoided; • All equipment must be kept in good working order, with immediate attention being paid to defective silencers, slipping fan-belts, worn bearings and other sources of noise; • Equipment must be operated within specifications and capacity (e.g. no overloading of machines); • Regular maintenance of equipment must be undertaken, particularly with regard to lubrication; • Equipment must be operated in such a way that the equipment is operated throughout the working periods instead of operating several items simultaneously; • Equipment shall be switched off when not in operation; • Appropriate directional and intensity settings must be maintained on all hooters and sirens; • The Contractor must ensure that the employees conduct themselves in an appropriate manner while on site; • Adjacent landowners shall be notified in writing if work needs to be carried out after hours; • Noise/vibration producing activities shall be limited to daylight hours (Monday to Friday 07H00 to 17H30 and Saturday 07H00 -14H00). However, no noise/vibration producing activities shall be undertaken on Saturdays unless this has been agreed to by the community.	Management and maintenance of construction vehicles. Management using noise dissipating technologies e.g. noise mufflers Control through the limiting of the activities to the daytime and the implementation of an open and transparent channel of communication	The mitigation measures ensure that the noise levels from the construction sites will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines and will ensure that the noise levels emanating from the construction sites will not have detrimental effects on the construction workers and surrounding communities/land owners.	Noise levels
Vegetation clearance and excavation of construction sites	Potential destruction of graves and areas of archaeological importance	Heritage Resources	Pre-Construction and Construction/Operation	• Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;	Control through clear demarcation of construction sites to ensure avoidance of graves and other heritage sites	The construction will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not	Impact avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved

				• Contractors shall be made aware of the archaeological resources that were identified during the HIA;
				• Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site without approval from SAHRA; and
				• Should any graves be identified during the pre-construction phase the contractors must:
				  o Fence off and install a gate around graves; and
				  o Maintain a buffer zone of 100 metres around all graves during construction and mining phases.
				• Should this buffer zone not be feasible, a phase 2 study must be conducted followed with a destruction permit application from SAHRA;
						have detrimental impacts on heritage sites	

Vegetation clearance and excavation of construction sites	Potential sealing and loss of fossils	Fossils	Pre-Construction and Construction/Operation	• If any palaeontological material is exposed during digging, excavating, or blasting, SAHRA must be notified. All development activities must be stopped, and a palaeontologist should be called in to determine proper mitigation measures, especially for shallow cave	Management of topsoil integrity for the reuse in rehabilitation	The construction will be undertaken in compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not have detrimental impacts on fossil resources	Impact avoided
Waste Management	Improper waste management has potential to contaminate water sources	Water resources (surface and groundwater)	Pre-Construction and Construction/Operation	*Separation of waste* • All waste shall be separated into general waste and hazardous waste; • Hazardous waste shall not be mixed with general waste and in doing so increase the quantities of hazardous waste to be managed; • General waste can further be separated in waste that can be recycled and or reused; • No littering shall be allowed in and around the site, a sufficient number of bins shall be provided for the disposal of waste; • Where necessary dedicate a storage area on site for collection of construction waste. *Storage of waste:* • No stockpiling of material shall be permitted within 100 m of water courses and/or drainage lines, or within 500 m of wetlands; • General waste will be collected in an adequate number of litter bins located throughout the construction site Bins shall be located no more than 50 m from construction sites; • Bins must have lids in order to keep rainwater out; • Bins shall be emptied regularly to prevent the bins from overflowing; • All work areas shall be kept clean and tidy at all times; • All waste management facilities will be maintained in good working order; • Waste shall be stored in demarcated areas according to type of waste; • Runoff from any area demarcated for waste will be contained, treated and reused; • Flammable substances must be kept away from sources of ignition and from oxidizing agents; • Waste shall not be buried or burned on site; and	Waste management	The mitigation measures will result in reduced the amounts of waste produced, will encourage re-use of material where possible and recycling of the material where possible. Disposal will be utilised as the last resort. The mitigation measures will also ensure that the management of waste will be in accordance with the National Environmental Management: Waste Act, 2008 (Act 51 of 2008)	Waste Management Impact on water resources avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• The maximum retention time for temporary storage of waste generated shall not exceed 30 days, provided the waste does not present a health hazard or risk of odour; *Disposal of hazardous waste:* • No dumping shall be allowed in or near the construction site; • Hazardous containers shall be disposed of at an appropriate licensed site; • Hazardous waste will be removed and managed by an approved service provider; • A safe disposal certificate will be provided by the approved service provider as proof of responsible disposal of hazardous waste; and • The safe disposal certificate shall be stored and provided on request; • Disposal of general waste: • No dumping shall take place in or near the construction site; • All general waste shall be disposed of to the nearest licensed landfill site; • Demolition waste and builder's rubble shall be disposed of to an appropriate licensed landfill site; and • The necessary permissions must be obtained to dispose of waste to a registered landfill site			
Vegetation clearance	Changes in the topography may be experienced as a result of bush clearing and construction vehicles on site	Topography	Pre-Construction and Construction/Operation	• Bush clearance will only take place in designated areas and kept as minimal as possible; • Construction foots prints shall be kept demarcated and to a minimum • Rubble will be removed frequently; • The construction activities will be screened to minimise the visual disturbance to surrounding landowners.	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas.	Implementing mitigation measure will minimise changes in topography and visual impacts	Rehabilitation standards End use objectives
Excavations	Removal of local geology as a result of construction activities	Geology	Pre-Construction and Construction/Operation				
Transportation of material and movement of vehicles and machinery on construction areas	Increased traffic on public roads may result in conflicts	Traffic/Social	Pre-Construction and Construction/Operation	• Ensure that where existing public roads are used to access the construction areas, adequate construction signage is in place to inform the public of increased construction activities in the affected areas; • Traffic signs shall be installed around the project site and surrounding areas to warn community road users of the presence of construction vehicles; • Local speed limits and traffic laws shall apply at all times to minimise the occurrences of accidents on public roads; • Where possible the transportation of construction materials and rubbish shall be undertaken outside traffic peak hours to minimise inconveniencing residents; • The number of construction vehicles and trips shall be kept to a minimum • Materials transported on public roads must be covered.	Speed control and limitation of the times when construction vehicles may be on the roads	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles	Impact avoided
Recruitment	Impact from the influx of job seekers and employment of farm labourers:	Social	All phases	• Recruitment will not be undertaken on site; • Recruitment process shall favour locals; • Where required, liaise with the SAPD to ensure safety of landowners in the areas; • Prepare an influx management plan	Management of the implementation of the SLP	Implementing mitigation measures will ensure recruitment of locals as per the requirements of the SLP for the proposed granite mine and will minimise conflicts with surrounding landowners and communities.	Impact managed/reduced

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Develop a local employment procedure and recruitment process • Prepare a code of conduct for all workers and contractors associated with the mine • Ensure that employees are provided with adequate health support, including the dissemination of the Health and Safety Policy and the HIV/AIDS policy • Ensure that employees are provided with any other awareness training required as part of the general employment contract with contract or permanent staff • Monitor for any escalation of poaching, petty crime or establishment of illegal settlements on land surrounding the mine. Such cases need to be addressed immediately and appropriately			

Table 35-2: Impact Management During the Operational Phase

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Disposal of waste rock on the waste rock dump	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• The waste rock disposal facility should be well maintained to ensure that the deposited waste material does not accumulate to form any sharp edges. Sharp edged are prone to wind erosion and the generation of dust plumes from such facilities; • Progressive rehabilitation should be implemented on the disposal facility to reduce wind erosion ads the generation of fugitive dust; • If the facility is observed as generating significant dust plumes, appropriate; and • Mitigation measures should be implemented to reduce the emission levels such as the installation of suitable wind breaks, and or wet suppression.	Soil monitoring and management of spills Groundwater and surface water monitoring	With the implementation of the mitigation measures and monitoring of the air quality, the mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Dust levels Particulate Matter levels
Transportation of product	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site; • Load wet suppression of materials transported by road (i.e. load spraying) or load covering with tarpaulins to reduce fugitive dust generation; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; • Avoidance of dust track-on onto neighbouring paved roads; and • Wind speed reduction through sheltering (where possible).	Soil monitoring and management of spills		
Fugitive vehicle emissions from the gravel maintenance road	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site;	Dust control Air quality monitoring	With the implementation of the mitigation measures and monitoring of the air quality, the mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Dust levels Particulate Matter level
Heavy vehicle exhaust emissions	CO, NO_2, SO_2 and fine particulate emissions affecting ambient air quality	Air quality	Operation	• All vehicles and other equipment should be maintained and serviced regularly to ensure that exhaust particulate emissions are kept to a minimum; • Vehicles should use low sulphur fuels; and • Vehicles should not be allowed to idle for more than 5 minutes when not in use to reduce particulate and combustion emissions.	Air quality monitoring		Particulate Matter level
Stockpiling of discard and waste rock. Storage within tailings dams	Soil contamination due to leaching of soluble product and waste constituents into soils underlying the stockpiles; and Contamination of soil adjacent	Soil, Land Use and Land Capability	Operation	• Implement suitable measures on mining infrastructure such as the waste dump areas to minimise soil contamination by controlling seepage and runoff.	Management and motoring of integrity of infrastructure	Implementation of mitigation measures will ensure that the mining activities do not have detrimental impacts on the soils, land use and land capability. .	Rehabilitation standards End use objectives

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
	to product and waste stockpiles due to run-off or seepage of soluble product or waste rock constituents.			• Implementing regular site inspections for materials handling and storage.			
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Contamination of soils by hydrocarbon pollutants	Soil, Land Use and Land Capability	Operation	• Accidental spills (concrete, chemicals, process water, hydrocarbons, waste) need to be reported as soon as practical so that effective remediation and clean-up strategies and procedures can be implemented. • Where possible, soil that is contaminated by fuel or oil spills, for example, from vehicles, will be collected to be treated at a pre-determined and dedicated location, or will be treated in situ, using sand, soil as absorption medium. • Practice good housekeeping in chemical storage areas and ensure that storage areas are bunded. • Remedy by treatment of contaminated soils.	Management and monitoring of spills		
Quarrying	Contamination of groundwater resource due to seepage from waste dump areas and other infrastructure into the local groundwater and subsequently decrease the water quality in the local area	Groundwater	Operation	• Minimise moisture content in the dumps. • Establish an appropriate borehole monitoring network. • Ensure that good housekeeping rules are applied, and emergency spill clean-up procedures and equipment are in place. • Draw-up and strictly enforce procedures for the storage, handling and transport of different waste materials. • Place oil traps under stationary machinery, only re-fuel machines at fuelling station, construct structures to trap fuel spills at fuelling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Ensure that facilities are well maintained good housekeeping rules are applied.	Management of erosion	Implementation of the mitigation measures will ensure that the quality of groundwater within the site will comply with the target DWS target water quality objective and will be of quality that can still be used by surrounding groundwater users.	Impact avoided
	Potential groundwater contamination resulting from seepage from waste dumps	Groundwater	Operation	• Minimise footprint and cap with soil and re-vegetate	Groundwater quality monitoring	Implementation of the mitigation measures will ensure that the quality of groundwater within the site will comply with the target DWS target water quality objective and will be of quality that can still be used by surrounding groundwater users	Groundwater Quality Standards
	Potential groundwater contamination resulting from seepage from surface infrastructure			• Management and maintenance of infrastructure in good working order			
	Potential groundwater contamination from poor waste and sanitation management			• Management and maintenance of sewage management infrastructure. • Supply chemical toilets where no permanent infrastructure exists			
	Potential groundwater contamination caused by spillages and accidents			• Good housekeeping, and adherence to good health and safety practices			
	Potential groundwater contamination caused by hydrocarbon chemicals storage			• Oil spill kits in case of spills of hydrocarbon chemical			
	Loss/ change of current land use, including reduced area for run-off; Soil disturbance due to excavation activities at quarry location as well as in surrounding soils. Modification of natural soil hydrological regime.	Downstream water resources	Operation	• Store all chemicals used on the site in bunded areas. • A stormwater management plan must be developed and implemented, • Dirty and clean water must be kept separate and where possible, clean water must be directed away from mine area to downstream water resources.	Monitor and manage water quality impacts	Implementation of mitigation measures will ensure that the mining activities do not have detrimental impacts on the soils, groundwater and surface water resources.	Rehabilitation standards

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Vehicles and use of equipment/ machinery	Water resource contamination from hydrocarbon spills from vehicles and equipment, sewage package plant, was-bay, change-house and laundry.	Downstream water resources	Operation	• Clean up spillages immediately and dispose of contaminated materials to a permitted waste site. • Maintain bunded areas. • Ensure stormwater management system complies to GN. 704; • Store all chemicals used on the site in bunded areas.		Implementation of mitigation measures will ensure that the mining activities do not have detrimental impacts on the soils, groundwater and surface water resources.	Water Quality Standards
Operational activities	Establishment and spread of alien invasive species	Flora	Operation	• Monitoring of relocation success of rescued and relocated floral SCC (if any) should take place during the operational phase; • Harvesting of protected floral species by mining and operational personnel should be strictly prohibited. • The operational footprint must be kept as small as possible in order to minimise impact on the surrounding environment; • Edge effect control needs to be implemented within disturbed areas; • Erosion berms and hessian sheets are to be used in areas where soils are susceptible to high levels of erosion; • No vehicles are allowed to indiscriminately drive through sensitive natural areas; • Upon completion of construction activities and decommissioning of temporary access road, all impacted and disturbed areas should be ripped, re-profiled and reseeded with an indigenous veldgrass mixture that will assist to stabilise soils as soon as possible; • During the operational phases of the project, erosion berms may be installed to prevent gully formation; • The following points should serve to guide the placement of erosion berms: o Where the track has a slope of less than 2%, berms every 50m should be installed; o Where the track slopes between 2% and 10%, berms every 25 m should be installed; o Where the track slopes between 10% and 15%, berms every 20 m should be installed; o Where the track has a slope greater than 15%, berms every 10 m should be installed. *Minimisation* • An AIPS control programme must be developed and implemented during all phases of the proposed project; • AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site; • It is recommended that the programme include: o A combined approach using both chemical and mechanical control methods; o Periodic follow-up treatments, informed by regular monitoring; and o Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas. *Rehabilitation* • Rehabilitate cultivated land in the project site that is not used for crop production; • Rehabilitate all sites that are disturbed by construction phase activities, as per the rehabilitation programme; and • Rehabilitate all disturbed footprints during the	Management and monitoring of vegetation clearance	The implementation of mitigation measures will ensure that the mining activities do not have detrimental impact on the area's flora, in particular indigenous species and species that are of conservation importance.	Alien Invasive Plant Species Eradication

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				closure and rehabilitation phases, as per the rehabilitation programme.			

Movement of vehicles	Mortality and disturbance of fauna	Fauna	Operation	<u>Death/injury during vegetation clearing and earth works</u>
				• An Environmental Compliance Officer (ECO) should be on-site during vegetation clearing to monitor for, and manage, any wildlife-human interactions. The ECO should be trained in inter alia, snake handling; and
				• As appropriate, fences should be erected to prevent fauna gaining access to construction and operational areas, such as open trenches and voids.
				<u>Vehicle-wildlife collisions</u>
				• Road signage indicating the potential presence and movement of wildlife should be installed within the construction footprints and along public roads.
				<u>Hunting, snaring and poisoning</u>
				• The handling, poisoning and killing of on-site fauna by mine and construction workers and contractors must be strictly prohibited; and
				• Employees and contractors should be made aware of the presence of, and rules regarding, fauna through suitable induction training and on-site signage.
				<u>Noise, vibrations and lights (sensory disturbances)</u>
				• General noise abatement equipment should be fitted to machinery and vehicles;
				• As required, noise shields, including earth berms, should be constructed around sites of noise origin;
				• Dust suppression using water bowsers/sprayers should be undertaken on all sites/facilities where dust entrainment occurs; and
				• Plan the lighting requirements of facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination. Possible options include:
				  ○ Zoning of areas of high and low lighting requirements;
				  ○ Movement activated lights as opposed to permanent lights; and
				• Reducing height and angle of lights.
					Management and enforcement of road speed limits	Mitigation measures will ensure that the animal life within in the project is not affected by the proposed project.	Impact avoided

Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Water courses	Operation	• Areas to be cleared should be clearly demarcated to prevent unnecessary clearing outside of these sites as to avoid approaching too close to the adjacent rivers. • See further mitigation measures detailed in the terrestrial ecology report. • Avoid the accumulation of non-perennial bodies of water such as flooded borrow pits / drainage canals and floodplain depressions where possible. • The mine should implement a monthly monitoring programme for surface water and the data used for comparative analysis between the upstream and downstream sites. • Information from this monitoring can be used to quickly implement management actions should there be a significant change in water quality directly downstream of the project area.	Surface water quality monitoring	Implementation of mitigation measures will enable the project to comply with the requirements of the NWA	Impact avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Contain and/or avoid potential spills which could make their way to adjacent water resources. • Maintain service roads to avoid erosion and excessive dust formation;			
Operational phase activities	Loss of ecological communities and surface water quality issued due to increased sedimentation and the potential mobilisation of pollutants	Soils Flora Surface water	Operation	• Aim for majority of the earth mobilisation activities associated with the mining activities to be conducted during the dry season, so as to limit the intensity of impact, particularly in terms of runoff of sediments; • Implement low impact construction techniques to minimise the impact on the surrounding and downstream river systems; • Vegetation clearing should be restricted to the proposed development footprints only, with no clearing permitted outside of these areas; • Areas to be cleared should be clearly demarcated to prevent unnecessary clearing outside of these sites as to avoid approaching too close to the adjacent rivers. • See further mitigation measures detailed in the terrestrial ecology report.	Monitoring of vegetation on site	Implementation of mitigation measures will assist with avoiding loss of and maintaining the biodiversity within the project area and will enable the project to comply with the requirements of the NWA	Impact avoided Impacts on flora, especially SCC is reduced or avoided
Operational and closure phase activities	Water Quality Deterioration – Acidic Mine Drainage	Surface water resources Groundwater	Operation	• The probability of acid mine generation during the operational phase of the mine should be established. • Water quality should be regularly monitored, and appropriate and timely remedial interventions made in the case of non-compliance. • Treating of decanting mine water to acceptable water quality levels can be achieved by the installation of a treatment plant. The level to which the water is treated should be determined in consultation with the DWS. As a minimum, treated water should meet the standards for use for livestock watering and irrigation. • Any water released to the environment should meet relevant DWS water quality guidelines for aquatic ecosystem, recreational, livestock watering, irrigation and/or domestic water use.	Surface water and groundwater quality monitoring Management through treatment	Implementation of mitigation measures will enable the project to comply with the requirements of the NWA	Water quality deterioration reduced
Operational phase noise	Noise nuisance	Noise	Operation	*Materials handling activities:* • The drop height policy should be maintained onsite. All equipment operators should be trained in the policy such that drop height reduction is implemented onsite; and • Wind speed reduction through sheltering (where possible). *Vehicle noise during ore haulage:* • Rigorous speed control to reduce the noise from vehicle traffic. It is recommended that a maximum speed of 20 km/h to be set on all unpaved roads and 40km/h on paved roads; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; and • Encouraging the receipt of materials during non-peak traffic hours to avoid traffic build-up and associated noise. *Heavy vehicle/machinery noise:* • Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures;	Management and monitoring noise levels	The mitigation measures ensure that the noise levels from blasting activities will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines and will ensure that the noise levels emanating from the mine will not have detrimental effects on the mine workers and surrounding communities/landowners.	Impact Avoided

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• All vehicles and other equipment should be maintained and serviced regularly to ensure that the noise levels are reduced; and • Vehicles should not be allowed to idle for more than 5 minutes when not in use.			
Operational phase	Employment	Socio- Economic	Operation	• Communities within the vicinity of the mine should be given special consideration in terms of the benefits arising from the project because they will be the most affected by the project. It is recommended that the following mitigation measures be implemented: • A local skills database must be developed and updated regularly. The skills database should be used for recruitment purposes to minimise the probability of nepotism or corruption during the recruitment process; • A monitoring system should be put in place to ensure that Golden Tropic's recruitment policy is adhered to.	Management of the implementation of the SLP		Impact enhanced
Operational phase	Skills transfer and development	Socio- Economic	Operation	As per Golden Tropic.'s SLP, Golden Tropic will: • Comply with the requirements of the Skills Development Act, which includes the submission of a Workplace Skills Plan and an Annual Training Report as per the Sector Education and Training Authority's requirements • Appoint a dedicated skills development facilitator within six months of the commencement of operations. • Ensure formation of a Training Committee. • Continue with payment and claiming of levy and grants with the MQA. • Developing and submitting the Workplace Skills Plan (WSP): Golden Tropic will annually compile a WSP in the prescribed MQA format and submit it timeously. • Conduct a skills gap analysis on an annual basis. • Provide opportunities to become functionally literate and numerate, i.e. ABET • Provide learnerships (incl. apprenticeships / artisan program) opportunities. • Provide core mining, industry-specific technical and operational skills training (excluding learnership related courses). • Provide management, administrative, environmental, health and safety skills training (excluding learnership related courses). • Provide soft skills and other informal training.	Management of the implementation of the SLP	Implementing mitigation measures will ensure recruitment of locals as per the requirements of the SLP for the proposed granite mine and will minimise conflicts with surrounding landowners and communities.	Impact enhanced
Operational phase	Community development	Socio- Economic	Operation	• Golden Tropic will engage stakeholders in the area to gauge whether they can align with any of their efforts to collaborate on some development initiatives planned for the communities. • Golden Tropic will also ensure the implementation of the SLP. • Additionally, the selection of project beneficiaries should be fair and directly affected parties should be given first preference.	Management of the implementation of the SLP	Implementing mitigation measures will ensure recruitment of locals as per the requirements of the SLP for the proposed granite mine and will minimise conflicts with surrounding landowners and communities.	Impact enhanced
Operational phase	Regional and economic development	Socio- Economic	Operation	• Golden Tropic will pay royalties and tax to the	Management of the	Implementing mitigation measures will ensure recruitment of locals as per the requirements of the	Impact enhanced

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				government. • Golden Tropic will adhere to their SLP commitments.	implementation of the SLP	SLP for the proposed granite mine and will minimise conflicts with surrounding landowners and communities.	
Operational phase	Loss of employment (construction workers)	Socio- Economic	Operation	• Skills development programmes should be implemented to capacitate employees, construction workers and community members with the skills necessary to secure other employment opportunities.	Management of the implementation of the SLP		Impact minimised
Operational phase	Health and safety risk	Socio- Economic	Operation	• Golden Tropic must adhere to all requirements contained in the Occupational Health and Safety Act (Act 85 of 1993) and the Mine Health and Safety Act (Act 29 of 1996). • The mine will be maintained during its lifetime to minimise the risk of mine personnel being injured because of failed machinery, and so forth. • Rigorous operational health and safety programmes should be implemented.	Manage through health and safety policies and training		Impact avoided
Operational phase	Possibility of unearthing unknown graves or other buried cultural/archaeological items	Archaeology and cultural heritage	Operation	• Chance find procedures will be implemented: • All work in the immediate vicinity of the find will cease; • The area will be demarcated with barrier tape or other highly visible means; o SAHRA will be notified immediately; o An archaeologist accredited with the Association for Southern African Professional Archaeologists (ASAPA) will be commissioned to assess the find and determine appropriate mitigation measures, which may include obtaining the necessary authorisation from SAHRA to undertake the mitigation measures; and o Access to the find by unqualified persons will be prevented until the assessment and mitigation processes have been completed.	Management of access to heritage resources and sites	Mitigation measures will ensure compliance with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999) and recommendations from the specialist. The mitigation measures will ensure that the construction activities do not have detrimental impacts on heritage sites	Impact avoided
Movement of construction vehicles	Risk of vehicle collision	Traffic	Operation	• Indicate areas where heavy vehicles will be expected with adequate signage.	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades where required	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles and will reduce conflict with other road users.	Impact avoided
	Risk of pedestrian accidents	Traffic	Operation	• Clearly indicate pedestrian crossings. • Educate drivers on potential areas of high pedestrian activity. • Educate community on dangers of construction vehicles new to their area.			
	Degradation of Public Roads	Traffic	Operation	• The deterioration over time must be monitored and a maintenance plan must be negotiated with the Provincial Authority.			
	Health and Safety Risk	Roads and Traffic	Operation	• The deterioration of public roads over time must be monitored, and a maintenance plan must be negotiated with the National Road Administration, with specific mention of the Monitoring and Planning departments that should be consulted.	Manage through health and safety policies and training	Implementing mitigation measure will ensure road safety along the public roads and onsite and to increase awareness of slow-moving vehicles and will reduce conflict with other road users.	Impact avoided
Disposal of waste rock on the waste stockpile	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• The waste rock disposal facility should be well maintained to ensure that the deposited waste material does not accumulate to form any sharp edges. Sharp edges are prone to wind erosion and the generation of dust plumes from such facilities; • Progressive rehabilitation should be	Dust control Air quality monitoring	With the implementation of the mitigation measures, mining activities will be undertaken such that the ambient air quality does not exceed the National Air Quality Standards.	Particulate Matter Levels Dust levels

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				implemented on the disposal facility to reduce wind erosion ads the generation of fugitive dust; and • If the facility is observed as generating significant dust plumes, appropriate mitigation measures should be installed to reduce the emission levels such as the installation of suitable wind breaks, and or wet suppression.			
Transportation by road	Fugitive dust and fine particulate emissions affecting ambient air quality	Air quality	Operation	• Wet suppression on unpaved plant roads with water and a suitable dust palliative to achieve the 95% control efficiency (water alone will only achieve a 75% control efficiency) should be implemented; • Rigorous speed control and the institution of traffic calming measures to reduce vehicle entrainment. A recommended maximum speed of 30 km/h to be set on all unpaved roads and 45 km/h on paved roads within the project site; • Load wet suppression of materials transported by road (i.e. load spraying) or load covering with tarpaulins to reduce fugitive dust generation; • Reduction in unnecessary traffic volumes by developing plans to optimise vehicle usage and movement; • Avoidance of dust track-on onto neighboring paved roads; and • Wind speed reduction through sheltering (where possible).			
Blasting	Blasting activities that may result in noise nuisance and fugitive dust, fine particulate emissions, and acrid blasting emissions affecting ambient air quality	Air Quality Noise Social	Operation	• Reduce Charge Mass/Delay over decreasing distance towards POI's of concern. • Accurate blasting plans and blasting charge calculations should be developed and/or calculated to ensure that good blasts are achieved without overcharging of the blastholes which will result in the generation of elevated levels of blasting emissions; • Inform Golden Tropic employees and neighbouring landowners and inhabitants about operation activities (specifically for blasting) at least 48 hours prior to blasting activities. • Ensure requirements for human health and safety relating to blasting are adhered to avoid unnecessary damage to infrastructures. • Immediate action will take place should thresholds exceed legal requirements for air blast (134 dB) and ground vibration (12.5 mm/s). • Blasting should not be delayed once the blast holes are charged as this can lead to degeneration of the explosives and the generation of elevated levels of noxious blasting emissions; • Prior to blasting a 500 m radius must be cleared of people and animals; • Increase stemming length; • Put in controls for management of stemming lengths; and • Blasting operations should be limited to days where the wind speed is reduced to limit the spread of the airborne blasting plume.	Management and monitoring of air quality (dust and particulate matter)	The mitigation measures ensure that the noise levels from blasting activities will be managed and measures will be taken to ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines and will ensure that the noise levels emanating from the construction sites will not have detrimental effects on the construction workers and surrounding communities/landowners. Comply with air blast (134 dB) and ground vibration (12.5 mm/s)	Dust and particulate matter levels Noise levels Air blast and vibration levels

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Storage of chemicals and fuel	Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Soil, Land Use and Land Capability Groundwater Surface Water	Operation	• Accidental spills (concrete, chemicals, process water, hydrocarbons, waste) need to be reported as soon as practical so that effective remediation and clean-up strategies and procedures can be implemented. • Where possible, soil that is contaminated by fuel or oil spills will be collected to be treated at a pre-determined and dedicated location, or will be treated in situ, using sand, soil as absorption medium. • Practice good housekeeping in chemical storage areas and ensure that storage areas are bunded. • On surface bulk storage of hydrocarbons must be situated in a dedicated area which will include a bund or a drain where necessary to contain any spillages during the use, loading and off-loading of the material. • Bunded areas shall contain 110% of the stored volume. • Bund areas must be impermeable. • Bund area must have a facility such as a valve/sump to drain or remove clean stormwater. • Place oil traps under stationary machinery, only re-fuel machines at fueling station, construct structures to trap fuel spills at fueling station, immediately clean oil and fuel spills and dispose contaminated material (soil, etc.) at licensed sites only. • Draw-up and strictly enforce procedures for the storage, handling and transport of different hazardous materials. • Ensure vehicles and equipment are in good working order and drivers and operators are properly trained. • Contaminated water shall be pumped into a container for removal by an approved service provider; • Regular inspections shall be carried out to ensure the integrity of the bundwalls; • All preventative servicing of earth moving equipment and construction vehicles shall conducted off site; • Runoff from the chemical storage area shall be contained;	Management and monitoring of spills Monitoring and management of the integrity of infrastructure	Implementation of mitigation measures will ensure that the mining activities do not have detrimental impacts on the soils, land use and land capability.	Impact avoided

Table 35-3: Impact Management During the Decommissioning and Closure Phase

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils	Soil, Land Use and Land Capability	Decommissioning and closure	• Ensure proper handling of hazardous chemicals and materials (e.g. fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets (SDS); • Dismantling of plant equipment and machinery should be carried out in designated appropriate facilities fitted with spillage containment, floors and sumps to capture any fugitive oils and greases. Develop detailed procedures for spills containment and soils clean up.	Management and monitoring of spills	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Removal of redundant infrastructure	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil, Land Use and Land Capability	Decommissioning and closure	• Conduct soil assessment to determine post decommissioning/ closure soil quality on rehabilitated infrastructural footprint. • Where possible, re-use stockpiled soil within as short a period as possible. • Use appropriate soil handling machinery, preferably avoiding heavy earth moving equipment used for decommissioning activities to minimise compaction. • Limit vehicle traversing on both stockpiles and rehabilitated areas as far as possible. • Prepare rehabilitated areas properly and monitor regularly.	Management and monitoring of soil stockpiles	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Grading of project site to ensure long-term drainage conditions on site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities, may result in degradation of soil quality due to soil disturbance. Contamination of soil by handling of soil with contaminated earth moving Machinery (machinery previously used for handling mine waste such as waste rock). Insufficient soil volumes to meet end land use soil requirements.	Soil, Land Use and Land Capability	Decommissioning and closure		Management and monitoring of soil stockpiles	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Destruction of all surface infrastructure; Backfill and closure of the mine areas.	Potential groundwater Contamination resulting from seepage from waste rock dump.	Groundwater	Decommissioning and closure	• Minimise footprint of waste rock dump by backfilling as much waste rock into underground mine and cap remaining waste rock with soil and vegetate	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
	Potential groundwater contamination resulting from remaining surface infrastructure	Groundwater	Decommissioning and closure	• Remove buildings for which alternative post-mining use is identified and rehabilitate site to pre-agreed conditions	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
	Potential groundwater contamination from poor waste and sanitation management	Groundwater	Decommissioning and closure	• Remove infrastructure unless post-mining use is identified and rehabilitate to pre-agreed conditions.	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
	Potential groundwater contamination caused by spillages and accidents	Groundwater	Decommissioning and closure	• Good housekeeping, and adherence to good health and safety practices during closure activities	Groundwater monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Removal of redundant infrastructure	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting	Downstream water resources	Decommissioning and closure	• Ensure that all contaminated areas are adequately removed and disposed of to a permitted waste site. • Clean up spillages immediately and dispose of contaminated materials to a permitted waste site.	Management of spills Water quality monitoring	The surface water leaving the rehabilitation site will comply with the DWS target water quality parameters.	Rehabilitation Standards End use objectives

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
	in hydrocarbon contamination of exposed soils.						
Grading of project site to ensure long-term drainage conditions on site	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Downstream water resources	Decommissioning and closure	• Re-use stockpiled soil within as short a period as possible. • Use appropriate soil handling machinery to Minimise compaction • Limit vehicles traversing on both stockpiles and rehabilitated areas as far as possible. • Prepare rehabilitated areas properly and monitor regularly.	Water quality monitoring	The surface water leaving the rehabilitation site will comply with the DWS target water quality parameters.	Rehabilitation Standards End use objectives
Soil placement and revegetation of project site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities may result in erosion and sedimentation. Contamination of soil by handling of soil with contaminated earth moving machinery (machinery previously used for handling mine waste such as waste rock).	Downstream water resources,	Decommissioning and closure	• Revegetate as quickly as possible to limit erosion and sedimentation in downstream water resources.	Water quality monitoring	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives

Vegetation clearing and earth works	Establishment and spread of alien invasive species	Terrestrial ecology	Decommissioning and closure	*Minimisation*
				• An alien invasive species (AIS) control programme must be developed and implemented during all phases of the proposed project;
				• AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site;
				• It is recommended that the programme include:
				  ○ A combined approach using both chemical and mechanical control methods;
				  ○ Periodic follow-up treatments, informed by regular monitoring; and
				  ○ Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas.
				Rehabilitation
				• Rehabilitate cultivated land in the project site that is not used for crop production;
				• Rehabilitate all sites that are disturbed by construction phase activities, as per the rehabilitation programme; and
				• Rehabilitate all disturbed footprints during the closure and rehabilitation phases, as per the rehabilitation programme.
					Management of alien invasive plant species
					Monitoring of rehabilitation areas
					Rehabilitation of affected areas
						Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards
							End use objectives

Decommissioning and closure phase activities	Permanent alteration of site topographical and visual character of due to presence of overburden dump	Visual	Decommissioning and closure	• Dismantle and remove all visible surface-built infrastructure during decommissioning; • Re-shape all footprint areas to be as natural in appearance as possible and actively revegetate using locally occurring grass species; • Stabilise and backfill and contour to ensure it is free draining; and • Establish a vigorous and self-sustaining vegetation cover using locally occurring grass species;	Management of visual impacts Monitoring of rehabilitated areas	Rehabilitated areas will be maintained to comply with the closure objectives.	Rehabilitation Standards End use objectives
Downscaling and retrenchment	Loss of employment	Socio- economic	Decommissioning and closure	• Timely and adequate consultation with employees who are dependent on the mine for employment.			

Activity	Potential Impact	Aspects Affected	Project Phase	Mitigation and Management Measures	Mitigation Type	Compliance with Standards	Standard to be achieved
				• Assisting employees in seeking alternative employment at other power plants or related facilities. • Training and education of employees to equip them with skills that could benefit them in other industries. • During the operational phase, members of the workforce will be encouraged to obtain skills or qualifications that are recognised by the National Qualifications Framework and are registered through the Mining Qualifications Authority. These qualifications include non-mining skills that will assist employees in areas other than mining. • Initiatives should be aligned with SLP commitments relating to downscaling and retrenchment.			
Downscaling and retrenchment	Reduced regional economic development	Socio- economic	Decommissioning and closure	• Engage local and regional government with respect to the decommissioning phase.			
Downscaling and retrenchment	Reduced community investment	Socio- economic	Decommissioning and closure	• Golden Tropic will develop exit strategies for all its community development initiatives.			
Closure phase	The closure and rehabilitation phase should have no impact on any identified cultural and heritage resources	Archaeology and cultural heritage resources	Decommissioning and closure	• It is not expected that any mitigation measures will be required.			
Movement of construction vehicles	Risk of vehicle collision	Traffic	Decommissioning and closure	• Indicate areas where heavy vehicles will be expected with adequate signage.			
Movement of construction vehicles	Risk of pedestrian accidents	Traffic	Decommissioning and closure	• Clearly indicate pedestrian crossings. • Educate drivers on potential areas of high pedestrian activity. Educate community on dangers of construction vehicles new to their area.			
Movement of construction vehicles	Degradation of Public Roads	Traffic	Decommissioning and closure	• The deterioration over time must be monitored and a maintenance plan must be negotiated with the Provincial Authority.			

36 Impact Management Actions

Table 36-1: Impact Management Actions for the Construction Phase

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning stage	Ensure contractors are aware of the required management measures stipulated in the EMPr.
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning Stage	Ensure all construction staff is familiar with the Environmental Awareness Plan.
Project Kick Off and Planning		Control potential deviations from the approved EMPr.	Planning Stage	Ensure that all staff is familiar with the emergency procedure and plan.
Site Establishment and site clearance for the construction of infrastructure: • Upgrade existing accommodation and office precincts and structures of less than 5ha; • Vegetation Clearance for site establishment and infrastructure including dressing areas, dispatch yards accommodation and logistics areas and areas for compressors and generators greater than 20ha • Upgrade or construct new workshop approximately ±0.5ha • Hydrocarbon storage less than 30m³ • Establishment of Waste Rock Dump ±3.5ha • Residue Stockpiles/Deposits >0.5ha • Waste Management Facilities >0.5ha • Construction, expansion or decommissioning of waste management facilities and associated structures and infrastructure >0.5ha • Stockpiling of topsoil >0.05ha	Groundwater Contamination	Control through management and monitoring of spillages. Where spillages occur, the soil must be stripped and disposed of as stipulated in the EMPr.	Pre-construction and Construction phases	Compliance with the regulations under the GN704. Compliance with the NWA and conditions of the WUL
	Drawdown of groundwater leading low groundwater levels	Monitoring of groundwater levels	Pre-construction and Construction phases	Compliance with the NWA and conditions of the WUL
	Contamination of surface water resources (Samoep River, tributaries and drainage lines)	Monitoring through rehabilitation and management of spills Rehabilitate contaminated areas	Pre-construction and Construction phases	Compliance with the regulations under the GN704. Compliance with the NWA and conditions of the WUL
	Loss of Species of Conservation Concern	Rehabilitation of areas cleared of vegetation. Control of alien invasive plant species	Pre-construction and Construction phases	Comply with existing legislation National Environmental Management: Biodiversity Act 2004 (Act No 10 of 2004) and Alien and Invasive Species Regulations, 2014. No vegetation clearance outside of demarcated areas
	Migration of animal life due to disturbance caused proposed project:	Relocation of affected species of conservation importance Management of site activities	Pre-construction and Construction phases	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation
	Mortality and disturbance of fauna	Management of site activities	Pre-construction and Construction phases	Remain within the designated area demarcated for mining activities. Ensure minimal clearance of vegetation
	Loss of soils, erosion of the soils and impacts on landowner's livelihood	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Retain topsoil integrity for the reuse in rehabilitation Vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas
Transportation of material and movement of vehicles and machinery on construction areas	Possible increase in nuisance dust and carbon emissions and ambient air pollutants (NOx and Sox) due to movement of vehicles and operation of machinery and equipment	Dust control measures	Pre-construction and Construction phases	Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural communities. Comply with the requirements of the Minimum Emission Standards
Vegetation clearance and excavation of construction sites	Visual intrusion as a result of movement of machinery and erecting of contractor camps as well as clearance of vegetation	Control and keep to a minimal the number of vehicles used for construction. Vehicles must be maintained to ensure efficient use of fuel.	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum. Vehicles and machinery required for construction activities will be kept to a minimum

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards
Transportation of material and movement of vehicles and machinery on construction areas	Increase in ambient noise levels due to movement of vehicles and machinery	Management and maintenance of construction vehicles. Management using noise dissipating technologies e.g. noise mufflers Control through the limiting of the activities to the daytime and the implementation of an open and transparent channel of communication	Pre-construction and Construction phases	Remain within the Noise Regulation Standards for Rural Areas. Ensure that noise levels are below the National Noise Control Regulations, SANS 10103:2008 Guidelines
Vegetation clearance and excavation of construction sites	Potential destruction of graves and areas of archaeological importance	Control through clear demarcation of construction sites to ensure avoidance of graves and other heritage sites	Pre-construction and Construction phases	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Vegetation clearance and excavation of construction sites	Potential sealing and loss of fossils	Management of topsoil integrity for the reuse in rehabilitation	Pre-construction and Construction phases	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Waste Management	Improper waste management has potential to contaminate water resources	Waste management	Pre-construction and Construction phases	Comply with the requirements of the National Environmental Management: Waste Act, 2008 (Act 51 of 2008)
Blasting	Blasting activities that may result in noise nuisance and fugitive dust, fine particulate emissions, and acrid blasting emissions affecting ambient air quality	Management and monitoring of air quality (dust and particulate matter)	Pre-construction and Construction phases	Comply with the National Noise Control Regulations, SANS 10103:2008 Guidelines Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural communities.
Vegetation clearance	Changes in the topography may be experienced as a result of bush clearing and construction vehicles on site	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum.
Excavations	Removal of local geology as a result of construction activities	Control of the construction footprints and ensuring that vegetation clearance shall be kept to a minimum. No clearance of vegetation outside demarcated areas	Pre-construction and Construction phases	Ensure vegetation clearance and footprints of excavated area are kept to a minimum.
Transportation of material and movement of vehicles and machinery on construction areas	Increased traffic on public roads may result in conflicts	Speed control and limitation of the times when construction vehicles may be on the roads	Pre-construction and Construction phases	Minimise the number of vehicles on the roads and movement of vehicles shall be kept to outside busy times
Recruitment	Impact from the influx of job seekers and employment of farm labourers:	Management of the implementation of the SLP	Pre-construction and Construction phases	Comply with the provisions of the SLP

Table 36-2: Impact Management Actions for the Operational Phase

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
Disposal of waste rock on the waste stockpile	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	Comply with the requirements of the National Environmental Management: Air Quality Act, 2004: Dust Regulation guidelines for rural communities Comply with the requirements of the Minimum Emission Standards
Transportation of product by road	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	
Fugitive vehicle emissions from the gravel maintenance road	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	
Heavy vehicle exhaust emissions	CO, NO_2, SO_2 and fine particulate emissions affecting ambient air quality	Air quality monitoring	Operation	
Waste disposal and movement of vehicles and machinery	Contamination of soils by hydrocarbon pollutants	Management and monitoring of spills	Operation	Comply with the NEM: WA
Quarrying	The decrease in local groundwater levels and potential contaminants in the groundwater due to infiltration of process water, may result in an indirect impact to local receptors including rivers and private boreholes	Monitoring of groundwater and surface water quality	Operation	Comply with the NWA Comply with conditions of WUL
	During operation, mining may require dewatering of the local groundwater which will thus form a groundwater drawdown zone around the mine quarry.	Monitoring of groundwater levels	Operation	Comply with the NWA Comply with conditions of WUL
	Contamination of groundwater resource due to seepage from dumps into the local groundwater and subsequently decrease the water quality in the local area	Monitoring of groundwater and surface water quality Monitoring and management of integrity of infrastructure	Operation	Comply with the NWA Comply with conditions of WUL
	Potential groundwater contamination resulting from seepage from waste rock dump	Monitoring of groundwater and surface water quality Monitoring and management of integrity of infrastructure	Operation	Comply with the NWA Comply with conditions of WUL
	Potential groundwater contamination from poor waste and sanitation management	Proper waste management and monitoring	Operation	Comply with the NWA Comply with eth NEM: WA Comply with conditions of WUL
	Potential groundwater contamination caused by spillages and accidents	Management and monitoring of spills	Operation	
	Potential groundwater contamination caused by hydrocarbon chemicals storage	Management and monitoring of spills Monitoring and management of integrity of infrastructure (storage areas and bund systems)	Operation	Comply with the NWA Comply with conditions of WUL
Mining dewatering	Lowering of water levels due to dewatering	Monitoring of groundwater levels	Operation	Comply with the NWA Comply with conditions of WUL
Quarry development, drilling and blasting	Loss/ change of current land use, including reduced area for run-off; Soil disturbance due to excavation activities at quarry location as well as in surrounding soils. Modification of natural soil hydrological regime.	Management of excavation activities to ensure the footprints are kept to a minimum Monitoring of soil stockpiles Soil assessment	Operation	Minimise footprints
Transportation of product and hauling of waste rock for storage in their respective storage facilities.	Water resource contamination from hydrocarbon spills from vehicles and equipment, sewage plant, wash-bay, change-house and laundry.	Surface water quality monitoring	Operation	Comply with the NWA Comply with conditions of WUL
Operation of waste rock dump and waste management facilities	Contamination of downstream water resources; blockage of stormwater management system;	Surface water quality monitoring	Operation	Comply with the NWA Comply with conditions of WUL Comply with GN704
Vehicles and use of equipment/ machinery	Contamination of soils and downstream water resources	Surface water quality monitoring	Operation	Comply with the NWA Comply with conditions of WUL
Vegetation clearing and earth works	Establishment and spread of alien invasive species	Management of infestation of alien invasive plant species through implementation of the eradication programme Monitoring mine area	Operation	Eradicate all alien invasive plant species as they emerge
Vegetation clearing and earth works	Mortality and disturbance of fauna	Relocation of affected species of conservation importance Management of site activities	Operation	Comply with the requirements of the Northern Cape Nature Conservation Act, No. 9 of 2009 and NFA
Land clearance for the proposed infrastructure, movements of	Degradation of water resources due to increased sedimentation and erosion	Implementation of the stormwater management plan Management and monitoring of the site for erosion	Operation	Comply with the NWA

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
construction vehicles in and around the direct project site				Comply with conditions of WUL
Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Surface water quality monitoring	Operation	
Construction phase activities	Loss of ecological communities due to increased sedimentation and the potential mobilisation of pollutants	Monitoring of vegetation on site	Operation	
Operational and closure phase activities	Water Quality Deterioration – Acidic Mine Drainage	Surface water quality monitoring Management through treatment	Operation	
Operational phase	Employment	Management of the implementation of the SLP	Operation	Comply with provision of the SLP and Employment policies
Operational phase	Skills transfer and development		Operation	
Operational phase	Community development		Operation	
Operational phase	Regional and economic development		Operation	
Operational phase	Loss of employment (construction workers)	Management of the implementation of the SLP	Operation	
Operational phase	Health and safety risk	Manage through health and safety policies and training	Operation	Comply with provisions of the Occupational Health and Safety Act Comply with the provisions of the Mine Health Act
Operational phase	Possibility of unearthing unknown graves or other buried cultural/archaeological items		Operation	Comply with the requirements of the National Heritage Resources Act, 1999 (Act 25 of 1999)
Movement of construction vehicles	Risk of vehicle collision	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades	Operation	Comply with road speed controls and limits
	Risk of pedestrian accidents	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades s	Operation	Comply with road speed controls and limits
	Degradation of Public Roads	Speed control and limitation of the times when construction vehicles may be on the roads Manage through road upgrades	Operation	Maintenance of access roads and upgrade of roads where required
	Health and Safety Risk	Manage through health and safety policies and training	Operation	Comply with provisions of the Occupational Health and Safety Act Comply with the provisions of the Mine Health Act
Disposal of waste rock on the waste stockpile	Fugitive dust and fine particulate emissions affecting ambient air quality	Dust control Air quality monitoring	Operation	Comply with the provisions of the National Air Quality Standards.
Storage of chemicals and fuel	Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Management and monitoring of spills Monitoring and management of the integrity of infrastructure	Operation	Comply with the requirement of the NEM: WA

Table 36-3: Impact Management Actions for the Decommissioning and Closure Phase

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
Spills of chemicals (e.g., hydrocarbon). Soil contamination on adjacent land potentially occurring due to inappropriate waste disposal and potential oil and diesel leakages from vehicles and machinery	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives. Comply with the requirements of the NEM: WA
Removal of redundant infrastructure	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil monitoring and management of spills	Decommissioning and closure	Comply with the closure objectives
Grading of project site to ensure long-term drainage conditions on site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities, may result in degradation of soil quality due to soil disturbance. Contamination of soil by handling of soil with contaminated earth moving machinery (machinery previously used for handling mine waste such as waste rock). Insufficient soil volumes to meet end land use soil requirements.	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA Comply with provisions of the WUL
Destruction of all surface infrastructure; Backfill and closure of the quarries with dump material; and Flooding of mining works and resultant altering of the groundwater flow regime.	Continued depressed groundwater levels due to dewatering during mining.	Groundwater monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA Comply with provisions of the WUL
	Continued decreased of base flow contribution to the on the Samoep River and tributaries			
	Surface and sub- surface decant from the proposed granite mine			
	Potential groundwater contamination from the proposed granite mine			
	Potential groundwater contamination resulting from seepage from waste rock dump.			
	Potential groundwater contamination resulting from remaining surface infrastructure			
	Potential groundwater contamination from poor waste and sanitation management			
	Potential groundwater contamination caused by spillages and accidents			
Removal of redundant infrastructure	Spillage of chemical solutions during the dismantling of plant equipment, pipelines or pumps which were in contact with chemicals solution may contaminate the soils; Spillage of diesel, oils and greases from the dismantled plant equipment, resulting in hydrocarbon contamination of exposed soils.	Soil monitoring and management of spills Groundwater and surface water monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA Comply with provisions of the WUL
Grading of project site to ensure long-term drainage conditions on site	Soil compaction in areas where active heavy machinery will be mobilised for the shaping of the final landform; and Loss of soil organic matter due to increased aeration (caused by soil disturbance) and subsequent organic matter decomposition.	Soil monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA Comply with provisions of the WUL
Soil placement and revegetation of project site	Soil handling to convey soil from topsoil stockpile to project site for surface rehabilitation activities may result in erosion and sedimentation. Contamination of soil by handling of soil with contaminated earth moving machinery (machinery previously used for handling mine waste such as waste rock).	Management of erosion	Decommissioning and closure	Minimise soil loss
Vegetation clearing and earth works	Establishment and spread of alien invasive species	Control and management through implementation of the Alien Invasive Plant Species eradication programme	Decommissioning and closure	Comply with the Alien Invasive Species Eradication Programmes
Use of heavy machinery	Changes in surface water quality due to contamination from heavy construction equipment	Surface water quality monitoring	Decommissioning and closure	Comply with the closure objectives Comply with provisions of the NWA Comply with provisions of the WUL
Decommissioning and closure phase activities	Permanent alteration of site topographical and visual character of due to presence of waste rock dump	• Monitor and manage visual impacts	Decommissioning and closure	Reprofile the area as much as possible Revegetate the dump to minimise visual impacts
Decommissioning and closure phase activities	Reinstatement of visual resource value due to dismantling of mining buildings and subsequent rehabilitation of footprint areas.	• Monitor and manage visual impacts	Decommissioning and closure	

Activity	Potential impact	Mitigation Measure (Impact Management Action)	Phase	Compliance with standard
	Visible dust plumes during rehabilitation.	• Dust control		
Downscaling and retrenchment	Loss of employment	• Manage qualifications of mine workers and implement programmes in the SLP to enable workers to source employment elsewhere on decommissioning of the mine.	Decommissioning and closure	Comply with provisions of the SLP Comply with provisions of the Labour Relations Act
Downscaling and retrenchment	Reduced regional economic development		Decommissioning and closure	
Downscaling and retrenchment	Reduced community investment		Decommissioning and closure	Comply with provisions of the SLP Comply with provisions of the Labour Relations Act
Closure phase	The closure and rehabilitation phase should have no impact on any identified cultural and heritage resources	• Manage and control access to heritage sites	Decommissioning and closure	Comply with provision of the NHRA
Movement of construction vehicles	Risk of vehicle collision	• Management and enforcement of road speed limits •	Decommissioning and closure	Comply with road speed limits
Movement of construction vehicles	Risk of pedestrian accidents	• Management and enforcement of road speed limits	Decommissioning and closure	
Movement of construction vehicles	Degradation of Public Roads	• Road upgrading	Decommissioning and closure	

37 Financial Provision

37.1 Description of closure objectives and extent to which they align with the baseline characterisation

The main aim in developing mine's rehabilitation plan is to mitigate the impacts caused by the mining activities and to restore land back to a satisfactory end land use. The rehabilitation plan must be developed as early as possible and maintained throughout the life of operation. It is important that the project's closure plan is clearly defined and understood by all involved before starting the process and is complementary to the rehabilitation objectives. The closure vision for the granite mining project is intended to inform the closure objectives and as such is currently stated as:

To implement a post mining landscape that is safe, stable and non-polluting over the long term, through collaboration with affected stakeholders

The overall closure objectives for the proposed project are as follows:

- Return land, mined, as far as possible to a land capable similar to that which existed prior to mining in consultation with the surrounding land uses;
- Ensure that as little water as possible seeps out of the various sections of the mine and where this is unavoidable, ensure that the water is contained or treated if the volume is significant and if it does not meet statutory water quality requirements;
- Remove mine infrastructure that cannot be used by a subsequent landowner or a third party.
- Where buildings can be used by a third party, arrangements will be made to ensure their long-term sustainable use;
- Clean up all stockpiles and loading areas and rehabilitate these as far as possible to a land capability similar to that which existed prior to mining;
- Rehabilitate the disturbed land to a state that facilitates compliance with applicable environmental quality objectives,
- Landscape the rehabilitated areas in alignment with the surrounding topography to prevent the unnecessary pooling of water which will reduce the runoff in the catchment;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible, reducing the overall visual impact;
- Physically and chemically stabilise any remaining structures to minimise residual risks;
- Leave a safe and stable environment for both humans and animals;
- To limit soil and surface/groundwater contamination by managing all water on site;
- Comply with local and national regulatory requirements;
- Form active partnerships with local communities to take care of management of the land after mining, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation and, if monitoring shows that the objectives have been met, making an application for closure.

Successful rehabilitation must be monitored to ensure sustainability. This requires an understanding of the basic baseline environment, as well as project management to ensure that the rehabilitation program is a success.

37.2 Confirmation that environmental objectives in relation to closure have been consulted with landowners

The draft EIA/EMPr will be made available to all registered I&APs for a 30-day review and comment period. All comments received and responses provided to the stakeholders will be incorporated into the final EIA/EMPr and will be collated into a Comments and Responses Register to be submitted to the DMR with the final EIA/EMPr for decision making.

37.3 Rehabilitation Plan

Granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration (Sizisa Ukhanyo Trading 830 CC, 2018).

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

Rehabilitation measures to be implemented include improving the visual appearance of the disturbed areas, establishing a cover to provide erosion control, improving runoff water quality by minimising silt loads and controlling dust. Concurrent rehabilitation and remediation are provided for in the annual rehabilitation plan and contain information that defines activities on an annual basis and how these relate to the final closure vision.

Annual reviews to be undertaken in terms of regulations 6(a) and 11(1)(a) of the NEMA Financial Regulations, that form part of the Annual Environmental Audit, assesses what closure objectives and criteria are being achieved through the implementation of the plan.

While some disturbed areas can be rehabilitated on a progressive basis during construction and operation,others cannot be rehabilitated until mining is complete. For this reason, some rehabilitation is generally still required during and after closure. Remedial initiatives to minimize environmental impact during and after mining are as follows (Sizisa Ukhanyo Trading 830 CC, 2018):

- The removal of surface infrastructure that cannot be used for other purposes or by third parties.
- The remediation and rehabilitation of quarries to remove the hazard they present to people and animals. This may be achieved through earthworks and contouring the mine area to as close as possible to the pre-mining topography. This includes filling quarries, trenches and excavations; making quarries' sides safe and covering the surface area with subsoil and topsoil as necessary; and mitigation or restoration of all surface disturbances and revegetation of the slopes and waste rock dumps.
- Removal and isolation of potential pollutants from the environment. Containment and treatment of contaminated water and correct storage and removal of hazardous materials.

Waste rock present specific problems, as they are unsuitable for other uses. For this reason, all waste rock and even low-grade product produced are destined to remain in the environment.

Depending on the nature of the operational activity, the need to manage risks and potential residual impacts may remain well after operations have ceased. The main closure objective is to get the rehabilitated area to a stable condition that is as close as possible to the original state and will not be detrimental to the safety and health of humans and animals and will be non-polluting. Successful rehabilitation must be monitored to ensure sustainability (Sizisa Ukhanyo Trading 830 CC, 2018). The basic rehabilitation and closure strategy will include:

- Infrastructure: The main post closure objective for the infrastructure areas is to leave the site in as safe and self-sustaining a condition as possible and in a situation where no post-closure intervention is required. The aim is to ensure that the affected environment is maintained in a stable condition that will not be detrimental to the safety and health of humans and animals and that will not pollute the environment or lead to the degradation thereof. The aesthetic value of the area will also be reinstated. The general approach adopted is the complete removal of all infrastructure and equipment. Redundant structures, buildings and civil foundations (down to one meter below surface for subsurface infrastructure) will be removed for use elsewhere or demolished and discarded. All steel structures and reinforcing will be discarded or sold as scrap. Building rubble will be buried together with any remaining waste blocks. The area will be screened for hydrochemical spillages and cleaned before it is ripped and levelled. All redundant infrastructures will be removed from the site and access roads maintained and handed over to the landowner in a good state of repair. All temporary waste storage areas need to be cleaned out and waste removed and disposed of at appropriate registered landfill sites. All waste material that cannot be recycled or reused will be removed from the site and disposed of at a registered landfill facility.
- Quarry and waste dumps: Granite mining operations typically have a permanent impact on rock masses that influence the topography on the site and can impact post-mining slope stability. As the ore body is traced deeper and deeper into the ground a series of benches for both access and safety needs to be used. Sometimes rock surrounding the ore has to be removed so that the sides of the quarry do not become dangerously steep. During mining, the waste rock is dumped away from the quarry onto a surface waste rock dump area. The opportunities for land use following open-quarry mining are limited, because it is very expensive to fill the quarry and the impact on topography can only be partially mitigated during rehabilitation (Sizisa Ukhanyo Trading 830 CC, 2018). Post mining topography for most of the area will follows the original landform shape except where changes due to quarrying or waste dumps have occurred. The main objective is usually to make the quarry walls safe and to landscape the waste rock dumps. Ore bodies like granite that lend themselves to quarry mining are not prone to causing water pollution and therefore water accumulating in the rehabilitated quarry can usually be used for a number of purposes. Due to semi-arid conditions the quarries will not intercept shallow groundwater table zones with resulting water-make in the quarry that will require pumping and storage in order to reduce inundation of active areas. All disturbed areas must be re-vegetated using indigenous plant species.

The basic rehabilitation methodology will strive to replicate the pre-mining topography, wherever possible, or at least not to increase overall slope gradients without emplacement of adequately designed erosion control or runoff diversion structures.

37.4 Explain why it can be confirmed that the rehabilitation plan is compatible with closure objectives

The management plan is in such a manner as to ensure concurrent rehabilitation. The closure objectives are to return the land disturbed by mining activities back to its original condition. The rehabilitation plan provides the detail on how this will be achieved as detailed in Section 37.3.

37.5 Quantum of financial provision required to manage and rehabilitate the environment

The financial provision for the environmental rehabilitation and closure of any mine/prospecting and its associated operations forms an integral part of the MPRDA. Sections 41 (1) and, 41 (2), 41 (3) and 45 of the MPRDA deal with the financial provision for rehabilitation and closure. During 2012, the DMR made updated rate available for the calculation of the closure costs, where contractor's costs are not available, these apply.

The "Guideline Document for the Evaluation of Financial Provision made by the Mining Industry" was developed by the DMR in January 2005 in order to empower the personnel at Regional DMR offices to review the quantum determination for the rehabilitation and closure for mining/prospecting sites.

With the determination of the quantum for closure, it must be assumed that the infrastructure had no salvage value (clean closure). The closure cost estimate (clean closure) was determined in accordance with the DMR guidelines.

The amount required to cover the rehabilitation is anticipated to be R 1 333 912.63 at this stage.

The Master Rates will be updated on an annual basis, based on CPIX or a similar approved method, or should legislation change. The first of these updates will take place during 2022 and continue to the year in which the review is taking place, and the overall document will be reviewed and updated whenever necessary (minimum requirement of annual updates).

37.6 Confirmation that the financial provision will be provided as determined

The amount required to cover the rehabilitation is estimated to be R 1 333 912.63 at this stage. Work will be carried out by the contractors and consultant and the costs are included in the estimate provided.

Golden Tropic will fund the operation and hereby undertakes to fund the operations and to manage the operations. The applicant (Golden Tropic) hereby confirms that the financial provision will be provided as determined.

38 Compliance monitoring and performance assessment

Golden Tropic will be responsible for the implementation of all monitoring, mitigation and management measures, as well as compliance with the EMPr. The recommended monitoring for the identified impacts is detailed below. The applicant will keep a record of all environmental monitoring taken on site.

38.1 Monitoring of Impact Management Actions

Please refer to Table 38-1

38.2 Monitoring and Reporting Frequency

Please refer to Table 38-1.

38.3 Responsible Persons (Roles and Responsibilities)

Generic roles that require to be defines for the project include:

- Competent Authority;
- Project Developer;
- Environmental Control Officer;
- Environmental Health and Safety (EHS) Manager; and
- Site Manager.

The typical requirements of each of the roles are provided in the following sections.

38.3.1 Competent Authority (DMR)

The DMR plays a lead role in the implementation of environmental policies, legislation and regulations. Their role is to ensure that the construction and operation of the proposed mining activities are conducted in a sustainable manner, in compliance with the relevant environmental legislation. DMR is responsible for approving the EMPr for the project and any revisions and amendments thereto.

38.3.2 Project Developer

The Project Developer (Golden Tropic) is the 'owner' of the project and as such is responsible for ensuring that the conditions of the Environmental Authorisation issued in terms of NEMA (should the project receive such authorisation) are fully complied with, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that Golden Tropic will appoint the Environmental Control Officer, EHS Manager and Site Manager.

Golden Tropic will be responsible for:

- Ensuring that all team members are aware of their roles and responsibilities;
- Taking overall responsibility for all activities that occur in the proposed project and associated infrastructure;
- Ensuring that all commitments/conditions contained in the EA and EMPr are communicated and adhered to by Golden Tropic employees to all team members and contractors.

During the *construction phase* Golden Tropic must:

- Appoint a Project Management Team to oversee the Contractor and act as a liaison between the Environmental Control Officer (ECO) and the Contractor;
- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedies problems timeously and to the satisfaction of the authorities;
- Appoint an independent and suitably qualified ECO to ensure that the Contractor abides by the EMPr;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.

During the *operation phas**e*** Golden Tropic must:

- Ensure that the Project Management Team oversees the Contractor and act as a liaison between the ECO and the Contractor/s;
- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedy problems timeously and to the satisfaction of the authorities;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.

During *decommissioning phas**e*** Golden Tropic must:

- Ensure that the Project Management Team oversees the Contractor and act as a liaison between the ECO and the Contractor/s;
- Ensure that the Contractor is aware of and adheres to the provisions of this EMPr;
- Ensure that the Contractor remedy problems timeously and to the satisfaction of the authorities;
- Ensure that an independent ECO audits the site to ensure compliance with the respective environmental legislation by parties.

38.3.3 Contractor (s)

The Contractor (s) (including Sub-Contractors) will report to the Project Management Team and be responsible for:

- Appointing an Environmental Representative who will ensure that all construction activities on site are undertaken in accordance with the EMPr;
- Drafting Environmental Method Statements to mitigate environmental impacts;
- Informing all employees and sub-contractors of their roles and responsibilities in terms of the EMPr;
- Ensuring that all employees and sub-contractors comply with this EMPr;
- Complying with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhering to any instructions issued by the project manager on advice of the ECO;
- Submitting an environmental report at identified site meetings on the environmental incidents that have occurred within the period before the site meeting;

- Arranging that all employees and those of the subcontractors receive appropriate training prior to the commencement of construction, taking cognisance of this EMPr and EA.

The Contractor has a duty to demonstrate respect and care for the environment in which they are operating. The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

38.3.4 Site Manager

The site manager will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the facility.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and ensuring that all employees and contractors and sub-contractors are aware of the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employ an Environmental Officer (or have a designated Environmental Officer function) to monitor and report on the daily activities on-site during the construction period.
- Ensuring that safe, environmentally acceptable working methods and practices are implemented, and that sufficient plant and equipment is made available, is properly operated and maintained in order to facilitate proper access and enable any operation to be carried out safely.
- Meeting on site with the EHS Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the programme.
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the EHS Manager.

38.3.5 Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed to monitor the compliance of the proposed project with the conditions of Environmental Authorisation (should such authorisation be granted by DMR) during the construction phase (and possibly the operational phase, depending on the requirements of DMR). The ECO must also monitor compliance of the proposed project with environmental legislation and conditions of the EMPr. The roles and responsibilities of the ECO should include the following:

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances. It is recommended that weekly or bi-weekly environmental audits be undertaken by the ECO during the construction phase.
- Environmental compliance reports must be submitted by the ECO to the DMR on an annual basis or as stipulated by the DMR.

- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by DMR) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.
- Prior to the commencement of construction, the ECO must meet on site with the Site Manager to confirm the construction procedure and designated construction areas.

38.3.6 Safety, Health and Environmental Representative

The EHS Manager will be appointed to fulfil the roles of the Environmental Officer during the construction phase and the Environmental Manager during the operational phase. The responsibility of the EHS Manager include overseeing the implementation of the EMPr during the construction and operational phases, monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessary. The EHS Manager is also responsible for monitoring compliance with the conditions of the Environmental Authorisation that may be issued to Golden Tropic

The lead contractor and sub-contractors may have their own Environmental Officers or designate Environmental Officer functions to certain personnel.

During construction, the EHS Manager will be responsible for the following:

- Meeting on site with the Site Manager prior to the commencement of construction activities to confirm the construction procedure and sites allocated for the mining areas and infrastructure required for the project.
- Daily or weekly monitoring of site activities during construction to ensure adherence to the specifications contained in the EMPr and Environmental Authorisation (should such authorisation be granted by DMR), using a monitoring checklist that is to be prepared at the start of the construction phase.

38.4 Time Period for Implementing Impact Management Actions

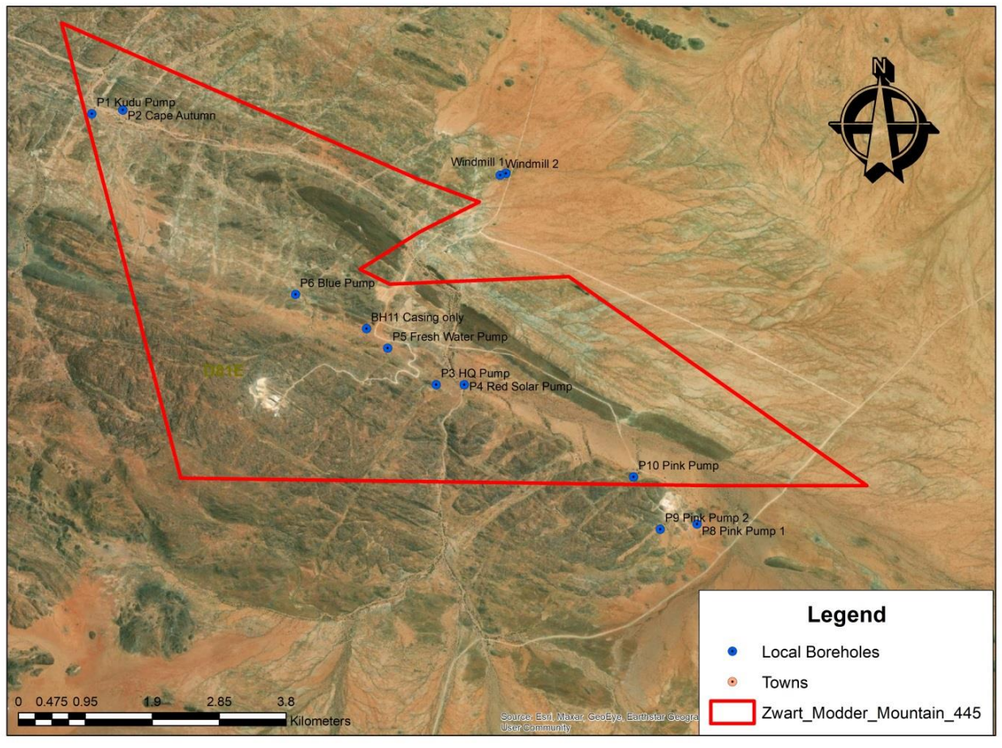
Please refer to Table 38-1.

38.5 Mechanism for Monitoring Compliance

Please refer to Table 38-1.

Table 38-1: Compliance monitoring and performance assessment against EMPr

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
Air quality	• Construction phase impacts and operational phase impacts	• Six (6) months prior to the construction phase (as agreed with the ECO), a suitable baseline dust fallout and particulate monitoring network should be installed along the boundary of the mining operation to establish baseline concentrations prior to the construction phase; • During construction, the baseline monitoring network should be maintained along the boundary of the mining operation to meet the NEM: AQA requirements; • The air monitoring network to include at a minimum dust fallout, PM_{10}, $PM_{2.5}$ and gaseous monitoring (SO_2 and NO_2); • A meteorological station should be installed onsite one month prior to the construction phase as this data is required for several NEM: AQA reporting requirements; and • Any complaints as to the management of onsite air quality should be directed to the site management. Complaints and any actions arising from a complaint will be recorded in a complaint register to be maintained by site management.			Golden Tropic, ECO, Contractors	Monthly monitoring and reporting
Soil quality	• Maintain the soil quality along areas which will be developed for mining as well as areas adjacent to mine waste storage facilities.	• Collection of at least one sample where visible signs of contamination is noted (spillage or seepage areas/zones)	• All areas which will be developed for mining	• pH and salinity; • Major anions and cations; • Sulphate, phosphate, Nitrate, total dissolved solids, electrical conductivity; • Heavy metals and hydrocarbons	Golden Tropic, ECO, Contractors	Biannually
Soil stockpiles	• Maintain and minimise the quality and degradation of soil stockpiles	• Collection of at least one composite sample per stockpile	• Soil stockpiles	• pH and Salinity; • Major anions and cations; • Organic matter content for the topsoil; • Content of major plant nutrients (CEC); • Major cations and anions; • Metal and hydrocarbons; • Stockpile height (<3 m).	Golden Tropic, ECO, Contractors	Biannually
Soil erosion	• Mitigate and minimise soil erosion	• Infrastructure and surface water bodies on-site to be maintained in accordance with the surface water management plan	• Soil stockpiles Developed areas Haul roads	• Visual assessment of soil stockpile heights and conditions (i.e. gullies and rills); • Assess the condition and effectiveness of vegetation on the stockpiles; • Assess any evidence of erosion (as per the Surface water management plan); • Assess the effectiveness of water versus other dust suppression	Golden Tropic, ECO, Contractors	Quarterly

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
				substances (e.g. molasses or bitumen).		
Land Use change	• Maintain and minimise land use change within the mining area	• Evaluation of changes in land use within the mining precinct using satellite imagery	• Mining Right Area	• Collection of satellite imagery	Golden Tropic, ECO, Contractors	Every two years
Rehabilitated Areas	• Maintain the quality and condition of rehabilitated areas	• Continuous monitoring of rehabilitated areas for closure compliance	• Disturbed areas	• Organic content of topsoil; • Content of major plant nutrients; • Contamination assessment (pH, metals, hydrocarbons, electrical conductivity, total dissolved solids, nitrates, sulphate and phosphates); • Volume of soil replaced;	Golden Tropic, ECO, Contractors	Annually
Groundwater	• Monitoring of groundwater levels and water quality	• The water level depth of the ten boreholes on site must be measured as shown in the figure below:  • Groundwater quality monitoring must be undertaken at the 4 boreholes (Pump 01, 04, 08 and 10) and analysed for the following parameters: pH, Electrical Conductivity (EC), Total Dissolve Solids (TDS - cal), Alkaline (Alk), Chloride (Cl), Sulphate (SO4), Nitrate (NO3), Ammonia (NH4), Fluoride (F), Calcium (Ca), Magnesium (Mg), Sodium (Na),			Golden Tropic, ECO, Contractors Groundwater specialist	Water quality monitoring on a quarterly basis during construction and annually during operation Water levels on a monthly basis

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
		Potassium (K), Aluminium (Al), Iron (Fe), Manganese (Mn), Chromium (Cr), Copper (Cu), Nickel (Ni), Zinc (Zn), Cadmium (Cd), Lead (Pb), Ecoli, Total coliform, NTU, Total Hardness (Thard - cal), Total Organic Carbon (TOC), Cyanide Screening, Langelier Saturation Index - cal				
Surface water	• Downstream water quality	• Establish a surface water monitoring programme upstream and downstream of the mine area (on the Samoep River and tributaries) • Surface water will be monitored for E coli, Dissolved Oxygen, pH, Electrical Conductivity (EC), Suspended Solids and Total Dissolved Substances			Golden Tropic, ECO, Contractors, water quality specialist	Monthly monitoring and reporting
Surface water	• Earth works and vegetation clearing during construction, operation and decommissioning	• Assess area for erosion and spillages			Golden Tropic, ECO, Contractors, water quality specialist	Weekly or daily during high rainfall periods until construction and decommissioning are complete
Surface water	• Use and storage of chemicals, including refueling areas	• Maintain storage areas; • Clean and dispose in accordance with legislation.			Golden Tropic, ECO, Contractors, water quality specialist	Daily inspection to ensure no leaks are visible; Clean-up in the event of spills.
Surface water	• Operations	• Monitor and maintain stormwater containment systems; • Clean and dispose in accordance with legislation.			Golden Tropic, ECO, Contractors, water quality specialist	Weekly or daily inspection during high rainfall periods; Monthly/ quarterly water quality samples for downstream water resources.
Terrestrial Ecology	• Establishment and spread of alien invasive species.	• An alien invasive species (AIS) control programme must be developed and implemented during all phases of the proposed project; • AIS control should be undertaken in both the project site, and natural habitat and rehabilitated areas immediately adjacent to the site; • It is recommended that the programme include: o A combined approach using both chemical and mechanical control methods; o Periodic follow-up treatments, informed by regular monitoring; and o Monitoring should take place in disturbed areas, as well as adjacent undisturbed areas.			Golden Tropic, ECO, Contractors, Ecologist	Bi-annually
Terrestrial Ecology	• Loss of SCC	• Permanent monitoring plots must be established in areas surrounding the surface infrastructure and rehabilitated areas. These plots must be designed to accurately monitor the following parameters: o Measurements of crown and basal cover; o Species diversity; o Species abundance; o Impact of dust on flora; o Recruitment of indigenous species; o Alien vs. Indigenous plant ratio; o Recruitment of alien and invasive plant species; o Erosion levels and the efficacy of erosion control measures; o Vegetation community structure including species composition and diversity which should be compared to pre-development conditions; and			Golden Tropic, ECO, Contractors, Ecologist	Bi-annually
	• Rehabilitation success o The rehabilitation plan must be continuously updated in accordance with the monitoring results in order to ensure that optimal rehabilitation measures are employed; o Results of the monitoring activities must be taken into account during all phases of the proposed mining development				Golden Tropic, ECO, Contractors, Ecologist	Every 5 years

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
	and action must be taken to mitigate impacts as soon as negative effects from mining related activities become apparent; and ○ The method of monitoring must be designed to be subjective and repeatable in order to ensure consistent results.	○ Presence, abundance and condition of floral SCC communities.				
Noise	• Noise Receptors	• One month prior to the construction phase, a suitable baseline noise monitoring campaign should be undertaken at the nearby sensitive receptors to establish baseline concentrations prior to the construction phase; • During construction, noise monitoring should be implemented quarterly; • During operations, noise monitoring should be implemented on an annual basis; • Any noise complaints should be directed to the site management. Complaints and any actions arising from a complaint will be recorded in a complaint register to be maintained by site management.			Golden Tropic, ECO, Contractors	Monthly monitoring and reporting
Blasting	• Vibrations; • Flyrock • Destruction/damage to infrastructure	• The following elements should be part of such a monitoring program: ○ Ground vibration and air blast results; ○ Blast Information summary; ○ Meteorological information at time of the blast; ○ Video Recording of the blast; ○ Fly rock observations. • A crack survey and vibration monitoring should be conducted at the nearest residence for each blasting cycle			Mine Engineer ECO SHE Officer	For each blasting cycle
Visual	• Visual Intrusion and loss of sense of place	• Visual monitoring shall be implemented at Key Observational Points (KOPs) which must be identified around the mine; • The visual monitoring programme will be based on the following parameters: ○ Airborne dust (in line with air quality assessment) ○ Visibility of lights at night from surrounding receptors; ○ Number of lights visible; ○ Vegetation cover and height; and ○ Disturbance to receptors.			Contractors Golden Tropic ECO	Annual
Traffic	• Risk of vehicle collision • Risk of pedestrian accidents • Degradation of Public Roads	• Develop a detailed traffic management plan that takes the following into account: ○ Indicate areas where heavy vehicles will be expected with adequate signage. ○ Cover materials being transported with tarpaulins where possible, ○ Dust suppression on roads. ○ Educate drivers on potential areas of high pedestrian activity.			Contractors Golden Tropic	As and when required

Aspect	Impacts requiring monitoring programmes / objectives	Functional requirements for monitoring			Roles and responsibilities	Monitoring and Reporting Frequency and Time Periods for Implementing Impact Management Actions
		Detailed Actions	Monitoring Location	Parameters		
		○ Educate community on dangers of construction vehicles new to their area. ○ The deterioration of public roads over time must be monitored and a maintenance plan must be negotiated with the Provincial Authority.				
Health and Safety	• Health and safety of personnel	• Routine safety checks, safety training and Inspections to be carried out during the construction and operation phase to enforce the use of Personnel Protective Equipment (PPE). This must also be included in the safety requirements of the Contract.			ECO, Site Manager, Contractor	Routine inspection and Quarterly reporting
Waste Management	• Waste Management	• Maintain a waste manifest book to record volumes of waste leaving the site, including recyclables. • Keep safe disposal certificates on file on site for Hazardous waste. • Way Bridge slips must be obtained for all other waste streams and kept on file on site			ECO, Site Manager	Monthly daily and report on a monthly basis
Heritage resources	• Destruction of graves and cultural resources	• No activities shall impact graves and sites of heritage or cultural importance without a permit from SAHRA • Chance find protocol must be implemented where heritage resources are uncovered.			ECO, Site Manager Heritage Specialist-when required	Monthly monitoring and reporting
Paleontology	• Destruction and sealing of fossils	• No activities shall impact fossils without a permit from SAHRA • Chance find protocol must be implemented where heritage resources are uncovered.			ECO, Site Manager Paleontologist, when required	Monthly monitoring and reporting
Stormwater Management	• Stormwater Management	• Visual monitoring based on sediment • Clean water must be kept separate from contaminated water emanating from the project sites			ECO, Site Manager	Monthly daily and report on a monthly basis Annual GN704 audits

39 Frequency of submission of performance assessment report

A monthly site visit and report shall be compiled by the ECO and will include all aspects of the EMPr, as required.

Annual environmental audits must be undertaken to ensure compliance with the EMPr and EA/WML. The environmental audit reports must also include the financial provision and must be submitted to the DMR.

40 Environmental Awareness Plan

It is important to ensure that the Contractors and employees associated with the proposed project the appropriate level of training and awareness to ensure that continual environmental due diligence and conservation is exercised at all levels of work carried out. Employees, contractors and sub-contractors must be made aware of their responsibilities in terms of relevant legislation, guidelines as well as this EMPr and EA.

Environmental conditions will be included in the contracts issued to the contractors, making them aware of the potential environmental impacts and risks associated with the proposed project. The importance of implementing the conditions in the EMPr and the necessity of good housekeeping practices will be made known to the contractors and employees of Golden Tropic and the contractors in order to prevent accidental spillages and avoid subsequent environmental impacts.

Training needs will be identified based on the EMPr requirements and capacity of Golden Tropic employees and contractors. In order to ensure environmental due diligence and protection of environmental harm, it is vital that all employees are trained to perform their designated role in alignment with the EMPr and EA.

The aim of the environmental awareness plan is to:

- Promote environmental education and conservation within the working place;
- Inform employees and contractors on the applicable environmental procedures and programmes;
- Provide job specific training on the specification of environmental conservation and protection applicable to the respective construction activities.

40.1 Communication of environmental risks

The training pertaining to the environmental awareness will include the following:

- All personnel (construction and operation staff) will undergo induction, which as a minimum will include Safety, Health and Environmental awareness;
- All attendees will sign an acknowledgement register upon receiving and understanding the induction;
- Environmental risks will be identified together with the specific job training that may be required to address these risks. Construction and operation staff will be trained on the implementation of emergency procedures where relevant.

An Environmental Awareness and Risk Assessment Schedule has been developed and is outlined in **Error! Reference source not found.**. The purpose of this schedule is to ensure that onsite employees are not only rained, but that the principles are continuously re-enforced.

Table 40-1: Environmental Training and Awareness Schedule

Frequency	Time allocation	Objective
Induction (all staff and workers)	1-hour training on environmental awareness training as part of site induction	Develop an understanding of what is meant by the natural environmental and social environment and establish a common language as it relates to environmental, health, safety and community aspects.

Frequency	Time allocation	Objective
		Establish a basic knowledge of the environmental legal framework and consequences of non - compliance. Clarify the content and required actions for the implementation of the EMPr. Confirm the spatial extent of areas regarded as sensitive and clarify restrictions. Provide a detailed understanding of the definition, the method for identification and required response to emergency incidents.
Monthly Awareness Talks (all staff and workers)	30 minutes awareness talks	Based on actual identified risks and incidents (if occurred) reinforce legal requirements, appropriate responses and measures for the adaptation of mitigation and/or management practices.
Risk Assessments (supervisor and workers involved in task)	Daily task-based risk assessment	Establish an understanding of the risks associated with a specific task and the required mitigation and management measures on a daily basis as part of daily toolbox talks.

40.2 Mitigation and management of Environmental Risks

As prescribed in **Error! Reference source not found.**, Task/Issue based Risk Assessments must be undertaken with all workers involved in the specific tasks in order to establish an understanding of the risks associated with a specific task and the required mitigation and management measures contained in this report.

40.2.1 Environmental Awareness Training Content

Induction Training: The following environmental awareness training will be provided to all staff and workers who will be involved in all the activities at the mine:

- Description of the approved activities and content of the mining right;
- An overview of the applicable legislation and regulations as they relate to environmental, health, safety and community;
- Content and implementation of the approved EMPr specifically:
    - Allocated roles and responsibilities;
    - Management and mitigation measures; and

- Identification of risks and requirements adaptation.

- Sensitive environments and features:
- Description of environmentally sensitive areas and features; and
- Prohibitions as it relates to activities in or in proximity to such areas.
- Emergency Situations and Remediation:
  - Methodology for the identification of areas where accidents and emergencies may occur, communities and individuals that may be affected;
  - An overview of the response procedure;
  - Equipment and resources;
  - Designate of responsibilities;
- Communication, including communication with the potentially affected communities and responsible authorities; and
- Training schedule to ensure effective response.

40.2.2 Development of procedures and checklists

The following procedures will be developed, and all staff and workers will be adequately trained on the content and implementation thereof:

- Emergency Preparedness and Response: The procedure will be developed to specifically include risk identification, preparedness, response measures and reporting. The procedure will specifically include spill and fire risk, preparedness and response measures. The appropriate emergency control centres (fire department, hospitals etc.) will be identified and the contact numbers obtained and made available on site. The procedure must be developed in consultation will potentially affected landowners. In the even that risks are identified, which may affect adjacent landowners (or other persons), the procedure will include appropriate communication strategy to inform such persons and provide response measures to minimize the impact.
- Incident Reporting Procedure: Incident reporting will be undertaken in accordance with an established incident reporting procedure to:
  - Provide details of the responsible person, including any person who
  - Is responsible for the incident;
  - Owns any hazardous substance involved in the incident;
  - Was in control when the incident occurred.
  - Provide details of the incident (time, date, location);
  - The details of the cause of incident;
  - Identify aspects of the environment affected;
  - The details of corrective action taken; and
  - The identification of any potential residual or secondary risks that must be monitored and corrected or managed.
- Environmental and Social Audit Checklist: An environmental audit checklist will be established to include the environmental and social mitigation and management measures as developed

and approved as part of the EMPr. Non-conformances will be identified, and corrective action taken where required.

41 Manner in Which Risks Will Be Dealt with In Order to Avoid Pollution or The Degradation of The Environment

The effectiveness and efficiency of this plan will be monitored by the performance of annual audits aimed at testing the environmental awareness of employees directly and the analysis of the root causes of environmental incidents, including non- conformance to legal requirements, to determine which incidents were caused by a lack of environmental awareness and training. Golden Tropic will establish a trained and equipped emergency response team to deal with foreseeable incidents such as fires, accidents and environmental impacts and to evaluate the Environmental Awareness Plan. This evaluation will entail the auditing of the operation during the construction and operation phase once the activity has commenced.

Management shall establish and maintain procedures for the internal communication between the various levels and functions of the organisation, and receiving, documenting and responding to relevant communication from external I&APs. The organisation shall consider processes for external communication on its significant environmental aspects and record its decision. Communication is a management responsibility. All line supervisors are responsible for effective communication within their own sections. Environmental risks will be dealt with through training and communication to ensure minimal degradation of the environment.

The Environmental Awareness Plan should be sufficient to make all those involved with the project aware of those risks that may occur as well as the necessary mitigation required to minimise these risks. Totapix and its contractors should take the Environmental Awareness Plan seriously in order to show that they are sensitive to the environment's well–being, empowerment of the local people and returning the land to appropriate use once the reclamation activities have been completed.

Non-compliance should be dealt with by the SHE and site manager on a case-to-case basis. Secondary offenders or serious offences should be dealt with immediately, and where necessary disciplinary hearings and suspension should be considered.

42 Specific Information Required by The Competent Authority)

All information committed to in the scoping report and as requested by the DMR to date has been incorporated in the EIA/EMPr.

The financial provision for the environmental rehabilitation and closure requirements of mining operations is governed by NEMA, as amended, which provides in Section 24P that the holder of a mining right must make financial provision for rehabilitation of negative environmental impacts. The financial provision will be reviewed annually as required by the DMR.

43 Conclusion and Recommendations

Ndi Geological Consulting Services (Pty) Ltd has undertaken the EIA and EMPr for the proposed granite mining by Golden Tropic in accordance with the requirements of the NEMA and National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEM: WA). This has included a comprehensive stakeholder engagement process which has sought to identify stakeholders, provide these parties with an adequate opportunity to participate in the project process and guide technical investigations that have taken place as part of the Impact Assessment Phase of this study. Specialist input has been included for all key environmental aspects that were identified during the scoping phase of the process.

Granite mining is usually considered a low environmental impact industry. There are no emissions besides those of the diesel-powered earthmoving equipment utilised in the mining activities. Contamination of water resources is only likely in the event of hydrochemical spillages from storage facilities and equipment, and these can largely be either prevented or cleaned up effectively.

Similarly, mining methods themselves generally have a low impact on the surrounding environment due to the need to carefully extract large blocks or slabs without damage to the stone. Recent advances in granite mining technology such as diamond wire sawing and rotary saw efficiency have resulted in further reduction in environmental impacts, significantly reduced the use of explosives in the extraction of blocks. This has resulted in higher recovery of saleable blocks and therefore less waste rock to be disposed of, as well as reducing the emissions of blasting gases (SO_2 and NO_X), noise and ground vibration.

The environmental impacts of granite mining are generally of low significance, short lived and can be mitigated to even lower levels of significance. Concurrent or progressive rehabilitation of disturbed areas is standard good practice and should be undertaken as it will reduce the mine's environmental liability and costs at closure as rehabilitation is included in the operational activities of the mine.

Various specialist studies were undertaken during the EIA Phase of the proposed project with the objective of identifying and weighing anticipated impacts and risks associated with the mining activities as well as in accordance with all relevant legislative requirements.

The findings of the impact assessment have shown that the proposed project will have negative impacts on the receiving environment, including:

- Land use change;
- Reduction in catchment yields as dirty water runoff within the mine;
- Loss of floral species and species diversity;
- Loss and fragmentation of habitat of faunal species and direct loss of fauna which will be expected to move from the area as a result of increased anthropogenic activities;
- Groundwater and surface water contamination due to chemical contamination from hazardous substance and fuel to be stored at the mine;
- Groundwater loss and flow from the quarry will also contribute toward baseflow reduction; and
- Nuisance noise, dust and visual impacts.

Where possible, mitigation and management measures, no-go areas, as well as further recommendations have been provided by specialists which will lead to a reduction in the significance of these impacts to medium and low significance, including:

- Ensuring the layout of the mining infrastructure does not impact on the water resources and regulated 100m buffer area without approval from the DWS;
- Ensuring the layout of the mining infrastructure does not impact on the heritage resources without approval from SAHRA;
- Stormwater management plan must be developed and implemented;
- Re-vegetation of the rehabilitated areas with indigenous species;
- Where possible rehabilitation will be conducted in tandem with construction and operational phases of the project;
- Develop and implement a biodiversity management plan; and
- The land use and the overall land capability as the soil can be rehabilitated to be reused for grazing and crop farming purposes.

Monitoring plans, which should be implemented throughout the life of the mine, have also been provided to ensure that adverse impacts are reduced, and continuous improvements are made.

With the correct and effective mitigation and management measures, including the protection of wetlands located outside the footprints of the mining areas and infrastructure, the mining operations are feasible.

Furthermore, the indirect impacts from the proposed development could cause negative impacts on the surrounding natural environment, unless this is also managed and monitored in order to address adverse impacts immediately. Rehabilitation must be implemented based on best practice principles and the DMR, DWS and DFFE should monitor activities during the construction, operational and closure phases of the proposed mine.

An EMPr has been developed as part of this EIA to ensure the mitigation of these impacts as far as practicable. It is anticipated that it will be possible to mitigate the environmental impacts to acceptable levels and the implementation will be monitored and audited to determine the effectiveness of the measures implemented. The EMPr is considered adequate to assist the project in striving towards the principles of the NEMA.

The project team believes that the EIA undertaken for the proposed granite mining project fulfils the process requirements of the NEMA and the NEM: WA. The EAP recommends that an EA/WML be issued by the DMR and that the construction and operation of the mine should be conducted under duty of care and must be in accordance with the recommendations that were included in this EIA/EMPr Report as well as conditions that will be included in the EA/WML by the DMR.

45 Undertaking regarding correctness of information

I Ndivhudzannyi Mofokeng herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties has been correctly recorded in the report.

Signature of the EAP

DATE: 15 November 2021

46 Undertaking regarding inclusion of comments and inputs from stakeholders and I&APs

I, Ndivhudzannyi Mofokeng herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties have been correctly recorded in the report.

Signature of the EAP

DATE: 15 November 2021

47 Undertaking regarding inclusion of inputs and recommendations from the specialist reports

I, Ndivhudzannyi Mofokeng herewith undertake that the information provided in the foregoing report is correct, and that the inputs and recommendation from the specialist reports have been included in the EIA/EMPr Report.

Signature of the EAP

DATE: 15 November 2021

48 Undertaking regarding the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed

I, Ndivhudzannyi Mofokeng herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from stakeholders and Interested and Affected parties has been correctly recorded in the report.

Signature of the EAP

DATE: 15 November 2021

49 Statement of Ndi Geological Consulting Services (Pty) Ltd independence

Neither Ndi Geological Consulting Services nor any of the authors of this report have any material present or contingent interest in the outcome of this report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of Ndi Geological Consulting Services.

Ndi Geological Consulting Services has no prior association with Golden Tropic in regard to the mineral assets that are the subject of this report. Ndi Geological Consulting Services has no beneficial interest in the outcome of the technical assessment being capable of affecting its independence.

Ndi Geological Consulting Service's fee for completing this report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the report.

50 References

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Appendices

Appendix 1: EAP Qualifications

Appendix 2: EAP CVs

Appendix 3: DMR Scoping Report and Plan of Study Acceptance Letter

Appendix 4: Locality Map

Appendix 5: Stakeholder Engagement Documentation

Appendix 6: Specialist Studies Reports

Appendix 7: Project Composite Map