



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

NAME OF APPLICANT: Caution Dinamics Central (Pty) Ltd

REFERENCE NUMBER: NC30/5/1/3/2/10193 MP

ENVIRONMENTAL MANAGEMENT PLAN

**SUBMITTED
IN TERMS OF SECTION 39 AND OF REGULATION
52 OF THE MINER
AL AND PETROLEUM RESOURCES DEVELOPMENT
ACT, 2002,
(ACT NO. 28 OF 2002) (the Act)**

STANDARD DIRECTIVE

Applicants for prospecting rights or mining permits, are herewith, in terms of the provisions of Section 29 (a) and in terms of section 39 (5) of the Mineral and Petroleum Resources Development Act, directed to submit an Environmental Management Plan strictly in accordance with the subject headings herein, and to compile the content according to all the sub items to the said subject headings referred to in the guideline published on the Departments website, within 60 days of notification by the Regional Manager of the acceptance of such application. This document comprises the standard format provided by the Department in terms of Regulation 52 (2), and the standard environmental management plan which was in use prior to the year 2011, will no longer be accepted.

IDENTIFICATION OF THE APPLICATION IN RESPECT OF WHICH THE ENVIRONMENTAL MANAGEMENT PLAN IS SUBMITTED.

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1 REGULATION 52 (2): Description of the environment likely to be affected by the proposed prospecting or mining operation

1.1 The environment on site relative to the environment in the surrounding area.

Status of the cultural environment that may be affected

The Namaqualand copper mines and their associated infrastructure and cultural landscape reflect the beginnings of the mining industry in South Africa in all the myriad ways in which that industry influenced and continues to influence society through the movement and housing of people, the development of transport and other infrastructure and industries and in the development of technological and scientific endeavour.

It also reflects the very close links between the development of the Southern African mining industry and mining technology pioneered in Britain, particularly in the counties of Cornwall and Devon, and the landscapes and social structures that went with them.

In its socio-cultural aspects, the Namaqualand copper mines saw the development of the first company towns of the industrial era in South Africa and the movement of people from various parts of the Cape Colony to Namaqualand to provide labour and to serve the trade that developed here.

Any form of mining or prospecting will therefore be a continuation of the socio-cultural aspects of the area.

Status of any heritage environment that may be affected

Mining will take place within a drainage channel that is in flood once a year and mining only takes place in the top 1.5m section containing river sand. The possibility to unearth any fossils or artefacts is therefore zero and given the high cost of a visit to this site, no first phase paleontological assessment is deemed necessary.

Fossils that might be found within the sandy deposits on the site are of generally low paleontological significance. Although potentially more important fossils may be present deeper down, it is not anticipated that excavations will penetrate deep enough to affect the relevant deposits.

No other heritage resources such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves of victims of conflict, and cultural landscapes or viewsapes are present on the mining area applied for.

Status of any current land uses and the socio-economic environment that may be directly affected

Approximately 90% of the region is used for livestock grazing and production, with the remainder comprising of agriculture and urban development. Tourism is a seasonal but rapidly growing feature – with visitors to the region arriving almost exclusively between July and October in order to take in the world renowned yearly flower display. Urban development is not a major feature of the landscape, and is not expected to increase much in the coming years.

Mining will only be a temporary land use where after land use will revert back to the pre-mining land use grazing. Productivity of the land with regard to land use is very low and mining will have no impact on the productivity of the area.

Status of any infrastructure that may be affected

No infrastructure will be affected due to the remote locality of the operation. Existing roads and tracks will be used and in the case of new tracks to be developed it will be addressed at final closure and rehabilitation.

Status of the biophysical environment that may be affected

Topography

Namaqualand is a unique and diverse environment – owing in large part to the presence of four distinct biogeographically regions within its boundaries. The Orange River valley lies to the north and is characterized by very dry desert conditions. In the west the area is composed of coastal plains – which transition into granite hills that straddle the escarpment, before transforming into low lying Bushmanland plains to the East of Springbok.

The area is characterized by an expansive, undulating landscape dominated by a plain of dry grasslands with scattered ancient rocky outcrops.

Soil

The sands and calcrete are of Quaternary sediments. The area is mostly representing the Af land type, with deep red sands predominant. Rainfall is low, 70-110 mm per annum, mostly falling in late summer to autumn. Average minimum and maximum temperatures in the area are 15°C to 38°C in summer and 0°C to 18°C in winter. The days in the summer are long (sunrise at around 6:00am, sunset close to 8:00pm), and short in the winters (sunrise after 07:30am, sunset before 6:00pm). The soils in a regional context are reddish, moderately shallow, sandy, and often

overlay layers of calcrete of varying depths and thickness. The soils are typically weakly structured with low organic content. These soils drain freely which results in a soil surface susceptible to erosion, especially wind erosion when the vegetation cover is sparse and gully erosion in areas where storm-water is allowed to concentrate. The soils in the area are generally not suitable for dry land crop production and the only area where intensive crop cultivation is feasible is along the Orange River where irrigation is possible therefore the pre-prospecting land capacity is categorized as Class III grazing land. The productivity of the area is very low at 8Ha/SSU.

The prospecting area has been classified into the following classes of land capability:

Arable land:	0 %
Grazing land:	100%
Wetland:	0 %
Wilderness land:	0 %
Urban and mining	0%

No topsoil is available within the drainage channel only river sand that is mined to a depth of about 1.5 meter.

Natural vegetation / plant life

Only pioneer species due to previous disturbance dominated by *Galenia africana* and *Blackalea inflata* an exotic species. The natural vegetation surrounding the proposed mining area is dominated by Bushmanland grassland. This vegetation type is characterized by *Rhigozum tricototum*, *Sipagrostis obtusa* and *S. ciliata*. On the rocky areas *Lyceum spp.*, *Laperosia spp.*, *Senesio spp* and *Salsola spp* are dominant. Other species include *Zygophyllum retrofractum* and *Asparagus spp*. Trees are represented by *Aloe dichotoma* and *Acasia karoo* in the drainage channels together with *Prosopis spp.* an exotic species.

Animal Life

Various small mammals and reptiles occur. Larger herbivore species are absent due to the conflicting land use. The habitat is well represented in the surrounding area.

Surface Water

All mining will take place in a riverine environment or drainage channel. The flow of the river will not be impeded in any way and damming upstream will not occur. The canalisation of the flow will not result in scouring or erosion of the river-bank. No well points or extraction pumps in use by other riparian users are present. Access to the riverbed for the purpose of conducting excavations in the river-bed, will be through the use of only one access at a time. The location of the access to the river channel across the river-bank will be at a point of the river-bank where the least excavation and damage to vegetation will occur and will not be wider than is reasonably required. Backfilling is not an option as all material in the form of river sand will be removed. Natural rocks present between the sand will be spread evenly over the bank of the channel to improve the aesthetic value of the area. The goal of rehabilitation with respect to the area where mining has taken place in the river-bed is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow. All scrap and other foreign materials will be removed from the bed of the river and disposed of as in the case of other refuse whether these accrue directly from the mining operation or are washed on to

the site from upstream. Surface water only accumulates in the excavations after exceptional good rains. Given the variability of semi-arid rainfall, the calculation of the mean annual runoff (MAR) would be of no use. The MAR is in any event very low given the low rainfall less than 250 mm per year occurring mainly in the summer months, high evaporation rates, and shallow grade of the slope toward the drainage channels and the permeability of the soils. The surface water quality (when available) is suitable for animal consumption but not for potable water. No natural wetlands exist in the area.

Groundwater

The majority of towns and farms rely on groundwater resources for potable water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas is critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption.

The average water level measured at 'rest' in the region is about 120m depending on the season. No groundwater will be used during the mining operation.

Air Quality

The air background quality in the area is very good due to low industrial activity and very low population density. Given the surrounding extent of semi-desert, dust generation is high under windy conditions (dust storm) however under normal conditions no extreme dust conditions are noted on site.

Noise

Background noise level is the same as for other small settlements and at present such noise levels are low, below 55dBA.

- 1.2 The specific environmental features on the site applied for which may require protection, remediation, management or avoidance.

Description of potential impacts identified on the cultural heritage environment

Mining will continue from an existing sand pit and will take place within a drainage channel that is in flood once a year and mining only takes place in the top 1.5m section containing river sand. The possibility to unearth any fossils or artefacts is therefore zero and given the high cost of a visit to this site, no first phase paleontological assessment is deemed necessary.

Fossils that might be found within the sandy deposits on the site are of generally low paleontological significance. Although potentially more important fossils may be present deeper down, it is not anticipated that excavations will penetrate deep enough to affect the relevant deposits.

No other heritage resources such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves of victims of conflict, and cultural landscapes or views are present on the mining area applied for.

Description of potential impacts identified on the socio- economic conditions

The only other land use in the area is small stock grazing and due to the small extends of the mining operation there will be no impact on productivity. Any mining operation developed as a result of prospecting operations will however have a positive impact on the socio-economic environment in the form of skills development and job creation.

Description of potential impacts identified on: employment opportunities, community health, and community proximity

The mining operation itself will not create many employment opportunities but the spinoffs due to infrastructure development and maintenance will contribute to employment and skills development.

Description of potential impacts identified on the biophysical environment

As mining will continue from an existing quarry all the impacts already exist and no new impacts will be created by this mining operation. The implementation of the mitigating and management measures prescribed in the section 3 will address all the existing and new impacts and after implementation of the mitigating measures most impacts can be classified as insignificant especially when looking at the current state of the environment. Due to the removal of all material for building purposes an excavation of maximum 2 meters deep will remain. No backfilling will take place therefore mixing of the geological sequence of sediment will not occur.

The excavation of the sand pit without the possibility of backfilling will have a significant negative impact on the visual aspect of the generally flat topography.

In most cases the topsoil cannot be distinguished from the subsoil and will therefore be removed for building.

Due to the shallow nature of operations the impact on the groundwater is considered insignificant. The absence of a waste handling program can however have a significant impact. Due to the change in topography there is a significant impact on visual aspects. This impact can be increased with the absence of an adequate waste management system.

1.3 Map showing the spatial locality of all environmental, cultural/heritage and current land use features identified on site.

Diagram 1: Locality plan (contemplated in regulation 2(2) read with regulation 2(3) of the MPRD Act, 2002 (Act No. 30 of 2002)

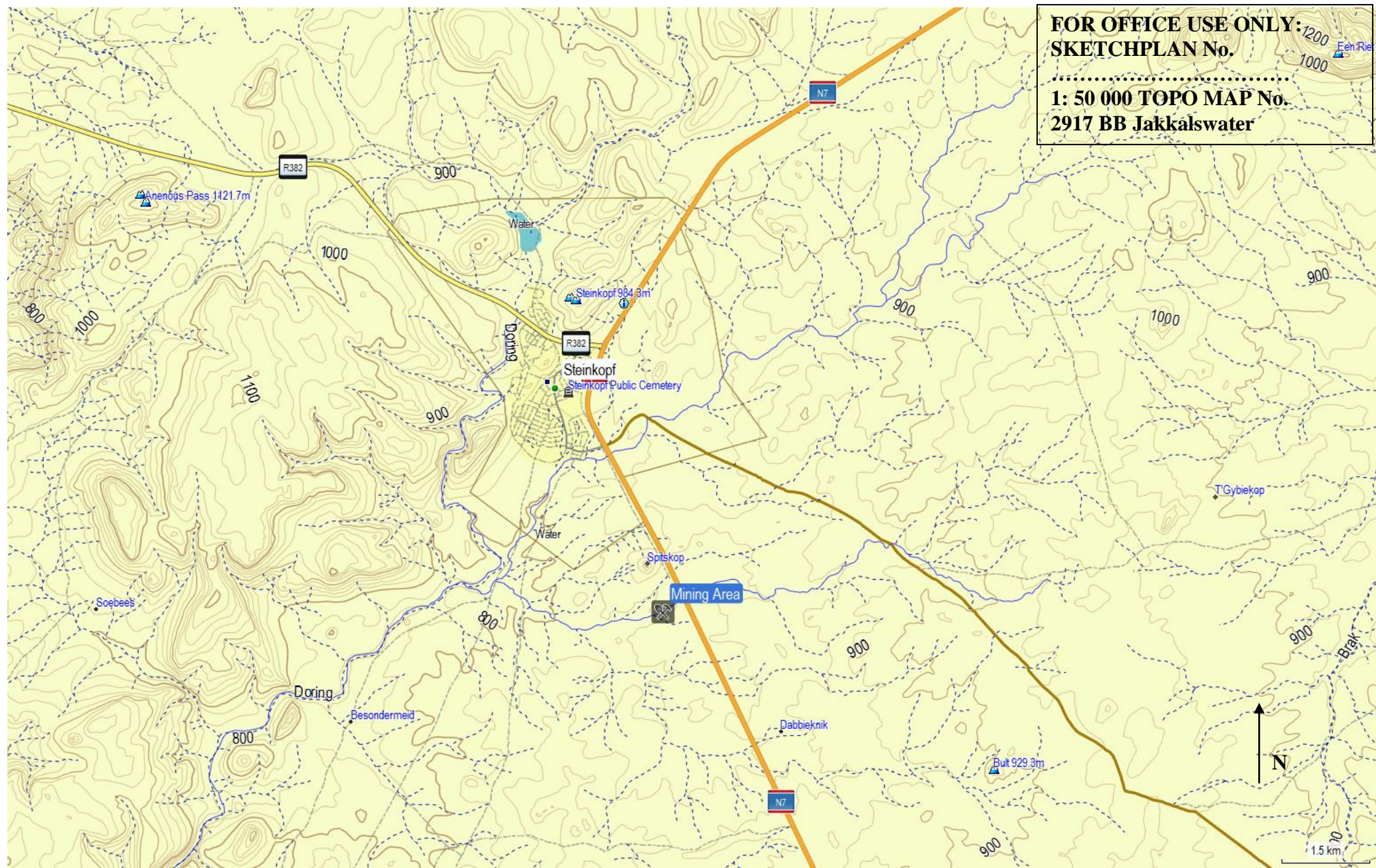


Diagram 2: Layout – Prospecting Blocks (contemplated in regulation 2(2) of the MPRD Act, 2002 (Act No. 30 of 2002))

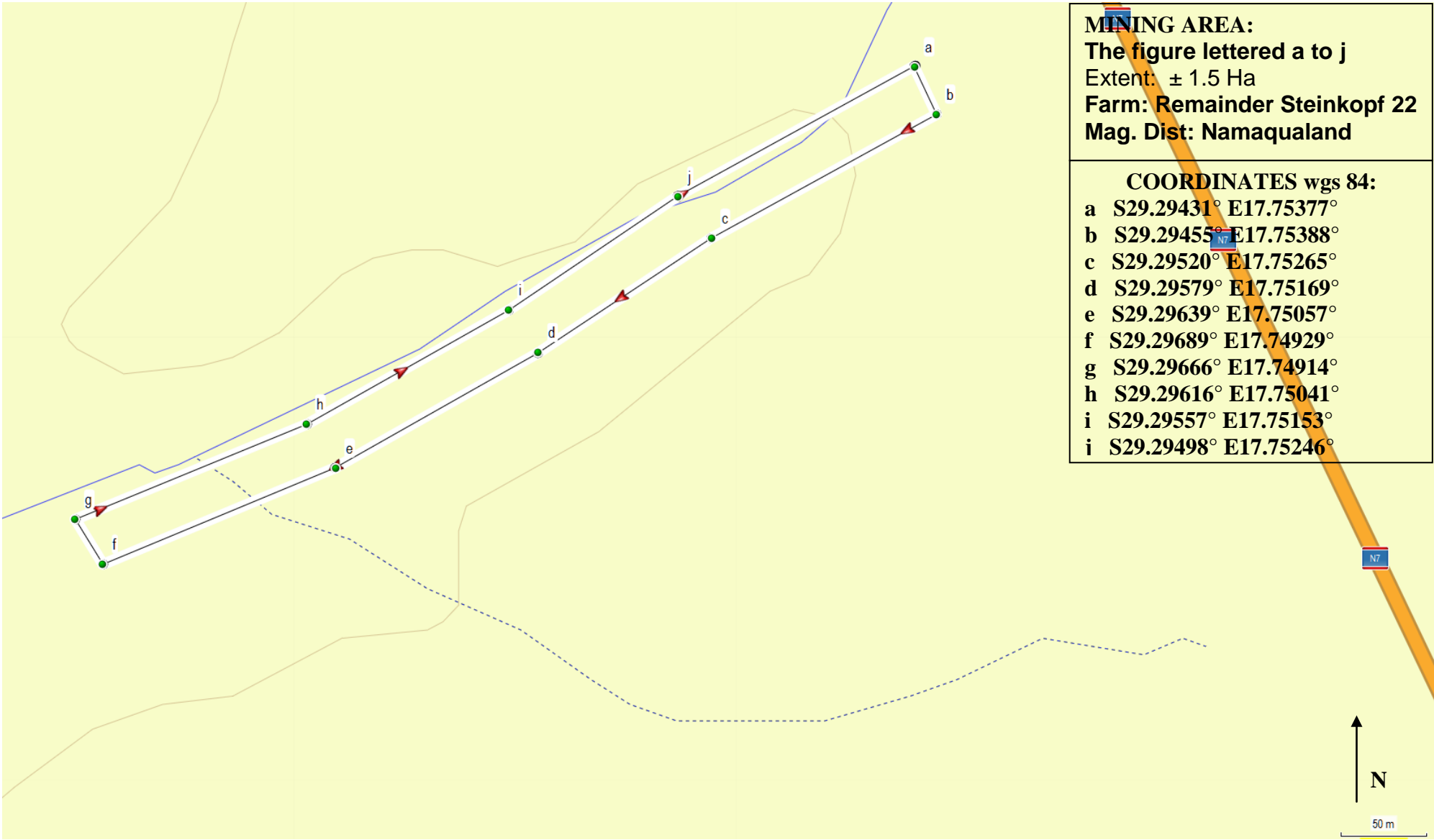
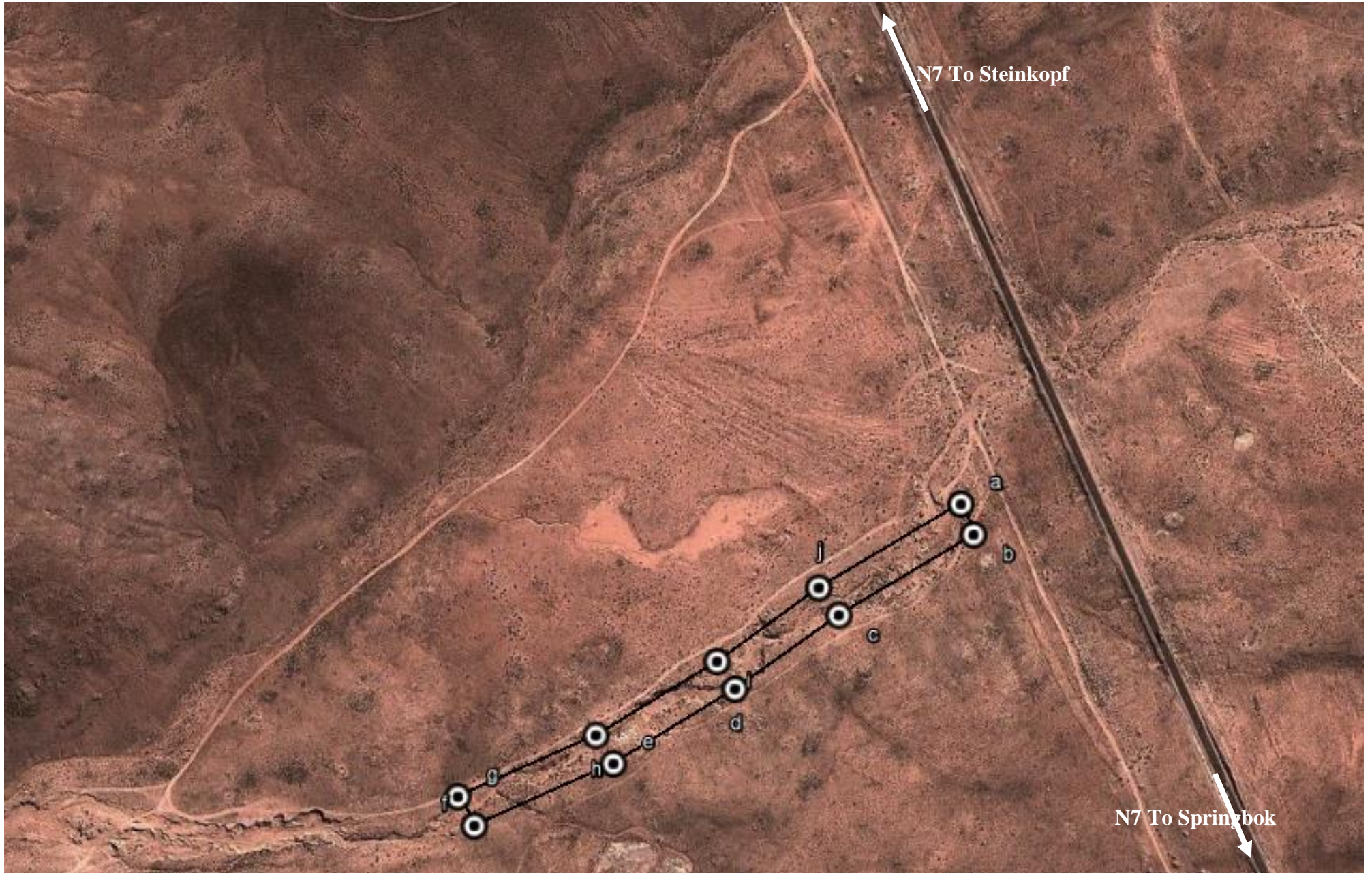


Diagram 3: Landscape



- 1.4 Confirmation that the description of the environment has been compiled with the participation of the community, the landowner and interested and affected parties,

The consultation report was made available to the landowners and all other interested parties for comment. All comments received were addressed in this EMPR.

2 REGULATION 52 (2) (b): Assessment of the potential impacts of the proposed prospecting or mining operation on the environment, socio-economic conditions and cultural heritage.

- 2.1 Description of the proposed mining operation.

- 2.1.1 Plan of the main activities with dimensions

The plan submitted under paragraph 1.3 show the main land uses on the proposed mining area and as can be seen the complete area is zoned as agricultural or unspecified land use. With regard to the mining activities no additional infrastructure including roads will be constructed that needs to be indicated on the plan.

The plans as contemplated in regulation 2.2, of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) will be updated on an annual basis with regard to the actual progress of the establishment of surface infrastructure, prospecting operations and rehabilitation together with an Performance assessment report as contemplated in regulation 55(1) (c) on the implementation of the Environmental Management Plan.

- 2.1.2 Description of construction, operational, and decommissioning phases

Construction phase

No infrastructure or roads will be constructed due to the small scale of operations that will only include loading and hauling of sand. No processing will take place that need infrastructure to be constructed.

Operational phase

An estimated total of 25 000ton of sand will be mined from the quarry for building purposes. The areas allocated for mining and stockpiling would first be stripped of all available topsoil. This topsoil would be stockpiled separately for later use when the quarry is rehabilitated.

All material except boulders will be removed to a depth of not more than 2 meters or stockpiled for later use as back filling. No blasting of rock will be done and no processing except screening will take place.

The estimated footprint of the proposed mining area including historic excavations is about 2Ha.

Decommissioning phase

Regulations 56 to 62 outline the entire process of mine closure, both as a guide to the process to be followed for mine closure, and also to address the legal responsibility with regard to the proper closure of operations. In terms of Section 37

of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002), the holder of a right is liable for any and all environmental damage or degradation emanating from his operation, until a closure certificate is issued in terms of Section 43 of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

"An application for a closure certificate must be accompanied by an environmental risk report which must include-

- (a) the undertaking of a screening level environmental risk assessment where-
- (b) the undertaking of a second level risk assessment on issues classified as
- (c) assessing whether issues classified as posing potential significant risks are acceptable without further mitigation;
- (d) issues classified as uncertain risks be re-evaluated and re-classified as either posing potential significant risks or insignificant risks;
- (e) documenting the status of insignificant risks and agree with interested and affected persons;
- (f) identifying alternative risk prevention or management strategies for potential significant risks which have been identified, quantified and qualified in the second level risk assessment;
- (g) agreeing on management measures to be implemented for the potential significant risks which must include-

2.1.3 Listed activities (in terms of the NEMA EIA regulations)

With regard to listed activities in terms of the Environmental Impact Assessment Regulations Listing Notice 2 of 2010, the competent authority in respect of the activities listed is the environmental authority in the province in which the activity is to be undertaken, unless the activity is to be conducted in or on a mining area or is to transform the area where the activity is to be conducted into a mining area in which case the competent authority is the Minister of Minerals and Energy. In this case all activities are to take place within a mining area therefore all activities will be covered by this EMPR.

The exception does not apply to the following activities contained in the notice 1; 2; 5; 8; 9; 10; 12; 13; 14; 17; 24 and 25.

The activities where environmental authorizations is required in addition to the approved EMPR are addressed below with their applicability to this specific operation

Activity Number	Activity description	
1.	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	Not applicable
2.	The construction of facilities or Infrastructure for nuclear reaction including energy generation, the production, enrichment, processing, reprocessing, storage or disposal of nuclear fuels, radioactive products and nuclear and radioactive waste.	Not applicable
5.	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included In the list of waste management activities published In terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	Not applicable

8.	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	Not applicable
9.	The construction of facilities or infrastructure for marine telecommunication.	Not applicable
10.	The construction of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day from and to or between any combination of the following: (i) water catchments (ii) water treatment works: or (iii) impoundments, excluding treatment works where water is to be treated for drinking purposes	Not applicable
12	The construction of facilities, infrastructure or structures for aquaculture of – (i) finfish, crustaceans, reptiles or amphibians where the facility, infrastructure or structures will have a production output of 200 000 or more kg per annum (live round weight), (ii) molluscs where the facility, infrastructure or structures will have a production output of 150000 or more kg per annum (live round weight) (iii) aquatic plants where the facility, infrastructure or structures will have a production output of 200 000 or more kg per annum (live round weight), excluding where the construction of facilities, infrastructure or structures is for purposes of offshore cage culture In which case activity 13 in this Notice will apply	Not applicable
13	The construction of facilities, infrastructure or structures for aquaculture of offshore cage culture of finfish, crustaceans, reptiles, amphibians, molluscs and aquatic plants where the facility, infrastructure or structures will have a production output of 100 000 or more kg per annum (live round weight).	Not applicable
14	The construction of an island, anchored platform or any other permanent structure on or along the sea bed.	Not applicable
17	The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils.	Not applicable
24	Construction or earth moving activities In the sea, an estuary, or within the littoral active zone or a distance of 100 metres Inland of the high-water mark of the sea or an estuary, whichever distance is the greater, in respect of: (i) facilities associated with the arrival and departure of vessels and the handling of cargo (ii) piers; (iii) inter- and sub-tidal structures for entrapment of sand; (iv) breakwater structures; (v) coastal marinas; (vi) coastal harbours or ports; (vii) structures for reclaiming parts of the sea; (viii) tunnels; or (ix) underwater channels; but excluding — (a) activities listed in activity 16 in Notice 544 of 2010, (b) construction or earth moving activities if such construction or earth moving activities will occur behind a development setback line; (c) where such construction or earth moving activities will occur in existing ports or harbours where there will be no increase of the development footprint or throughput capacity of the port or harbour; or (d) where such construction or earth moving activities takes place for maintenance purposes	Not applicable
25	The expansion of facilities for nuclear reaction including energy generation, the production, enrichment, processing, reprocessing, storage or disposal of nuclear fuels, radioactive products and nuclear and radioactive waste.	Not applicable

2.2 Identification of potential impacts

2.2.1 Potential impacts per activity and listed activities

This Sand-winning operation have been classified as dry-pit mining that consists of mining of pits on dry ephemeral streambeds and exposed sand bars with conventional shovels, trucks, bulldozers, scrapers or loaders. Dry pits are located above the water table. This type of mining is categorised by the Best Practice Guideline for small scale mining developed by the Department of Water Affairs and Forestry (DWAF) as a category C mine.,

Mining will only consist of the loading and hauling of sand from a seasonal drainage channel and no infrastructure including roads will be constructed. No processing will take place and the sand is sold as a FoT product.

The only activity that will have a potential impact on the environment will therefore be the development of the excavation itself and the stockpiles to be developed. The potential impacts of this mining operation on the environmental include potential Water-Related impacts according to the Best Practice Guideline for small scale mining developed by the Department of Water Affairs and Forestry (DWAF).

Topography - The excavation of the sand pit without the possibility of backfilling will have a significant negative impact on the generally flat topography. Excavations can also lead to bank destabilization. Excavation of flood terraces and riverbanks increases the instability of these riverbanks and enhances the likelihood of increased flood scouring. Watercourse alteration can also cause alteration in channel hydraulics. Excavations can also lead to ponding in the floodplain

Soil - The potential exist for ad hoc tracks to be developed. Soil compaction is also a possibility due to hauling and development of stockpiles. Soil pollution is also a possibility due to oil spills during routine maintenance of equipment.

Natural Vegetation – Mining can have a potential impact on the natural vegetation outside the drainage channel due to stockpiles. Riparian vegetation loss can cause accelerated erosion of areas adjacent to workings that have been de-vegetated for construction materials or fuel wood that will lead to increased suspended sediment loads in nearby streams and rivers.

Ground water - Chemical contamination (e.g. Oils; Diesel or Sewage can have an impact on groundwater quality.

Aesthetics Visual Impact - There is a potential for visual impact through the presence of stockpiles, excavations and loss of vegetation. The earthmoving equipment and general activities on site can also cause visual impact

2.2.2 Potential cumulative impacts

Singly, many of the effects of small-scale mining on the environment may well be insignificant. However, when they occur simultaneously or in a haphazard way, their significance may increase by orders of magnitude.

The majority of water-related impacts are localized i.e. affect the immediate vicinity of the mine only. If, however, many mines occur in the same area, then the cumulative impact may become significant and may be felt over a much larger area.

2.2.3 Potential impact on heritage resources

Mining will continue from an existing sand pit and will take place within a drainage channel that is in flood once a year and mining only takes place in the top 1.5m section containing river sand. Because of the presence of the low sensitivity washed river sands on the site, the potential impacts to fossil heritage are likely to be low. Furthermore, deep excavations into potentially more significant deposits are highly unlikely.

No built structures will be affected by the proposed development.

No known graves will be affected by the proposed development.

Cultural landscape elements are lacking on the site. The sense of place will be affected, however, but, due to the relatively limited extent of the visual impacts in the area, this impact is not considered very significant. Impacts to the sense of place are likely to be generally low due to the already altered state of the local area.

As mining will be taking place within a drainage channel that is in flood once a year and mining only takes place in the top 1.5m section containing river sand there is very little chance of fossils being present on the site. Should any fossils be discovered or unearthed in the process of mining, the permit holder will contact a South African Museum or University which employs palaeontologists so that the necessary paleontological salvage operations can take place. No other heritage resources such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and cultural landscapes or viewsapes are present on the mining area.

2.2.4 Potential impacts on communities, individuals or competing land uses in close proximity

The only identified land use is small stock grazing and due to the temporarily nature of change in land use and small scale of the operation mining will not have any impact and the land will revert back to its former use grazing with no impact on production. The area is farmland that is not close to any settlement therefore no land development projects are in progress.

2.2.5 Confirmation that the list of potential impacts has been compiled with the participation of the landowner and interested and affected parties

All proposals received during the consultation process have been addressed in this EMP.

2.2.6 Confirmation of specialist report appended.

No specialist reports are deemed necessary as no sensitive areas are included in the proposed area and due to the non-invasive nature of the proposed project.

3 REGULATION 52 (2) (c): Summary of the assessment of the significance of the potential impacts and the proposed mitigation measures to minimise adverse impacts.

3.1 Assessment of the significance of the potential impacts

3.1.1 Criteria of assigning significance to potential impacts

The impact on each of the aspects is measured according to the following table of significance:

Negative

High Significance	Recommended level always exceeded with associated widespread community action Disturbance to areas that are pristine, have conservation value, are important resource to humans and will be lost forever Complete loss of land capability Destruction of rare or endangered specimens May affect the viability of the project
Moderate	Moderate measurable deterioration and discomfort Recommended level occasionally violated - still widespread complaints Partial loss of land capability Complete change in species variety or prevalence May be managed Minor disturbances to aquatic ecosystems or local water resources Impact temporary Important but easily controlled by routine management actions
Minor/Insignificant	Minor deterioration change not measurable Recommended level will rarely if ever be violated Sporadic community complaints Minor deterioration in land capability Minor changes in species variety or prevalence
Positive	
Minor Significant	Improvements in local socio-economics Major improvements in local socio-economics with some regional benefits

Criteria used for the significance rating

- All surface disturbances are rated moderate to high depending on footprint
- Dust is rated low if only minimal dust is expected to accumulate over the permit period, medium if it is expected to require dust suppression such as watering, and high if there is a risk that it will migrate beyond the permit area.
- Noise is rated low if no machinery is to be used, medium if machinery is to be used, and high if there is a potential for complaints from public and neighbours.
- All drainage is rated moderate if the impact is temporary otherwise high
- All blasting is rated high
- All dust and noise from loading, hauling and transport is rated moderate
- Drainage from ablution facilities are rated moderate

3.1.2 Potential impact of each main activity in each phase, and corresponding significance assessment

Potential impact during Construction

Considerable changes take place as the mine infrastructure, plant and facilities are constructed, and when the ore body is first exposed. The scale and sequence of events varies from mine to mine, but always entails dramatic changes to most features of the local environment. The following is generic activities with regard to construction with potential environmental impact. Due to the specific nature of the operation not all activities will take place during this mining operation.

Potential Activities	Applicable to operation
Stripping/storing of topsoil	Yes for stockpile area
Preparation/levelling of sites	Yes for stockpile area
Installation of mine and surface water treatment plants	Not applicable
Construction of mine facilities, offices and roads	Not applicable
Construction of storage facilities	Not applicable
Landscaping of site	Not applicable
Construction of staff housing and infrastructure	Not applicable

Potential environmental impacts	Category
Fauna and flora habitat loss and disturbance	Natural Vegetation
Reduction in biodiversity on site	Natural Vegetation
Decreased aesthetic appeal of site	Aesthetics Visual
Altered drainage patterns and runoff flows	Topography
Increased erosion of site area	Soil
Increased siltation of surface waters	NA
Altered landforms due to construction	NA
Contamination of surface and groundwater by seepage and effluent discharges	Ground water
Discharge of contaminants via mine dewatering activities	NA
Increased demand on local water resources	NA
Ground and surface water contamination from seepage and contamination from fuel spills and leakages	Ground water

Potential impact during Operation

- **Removal and storage of ores and waste material**

The routine operational phases account for most of the environmental impacts and are considered to have the greatest potential to drive environmental change

Potential Activities	Applicable to operation
Stripping/storing of top soil	Yes for stockpile area
Waste rock stockpiles	Yes but very limited
Low grade ore stockpiles	Not applicable
High grade ore stockpiles	Yes but very limited

Potential environmental impacts	Category
Land alienation from waste rock stockpiles and disposal areas	Topography Natural vegetation
Increased erosion and siltation of nearby surface water bodies	NA

- **Processing - Milling and grinding Extraction/Concentration**

The routine operational phases account for most of the environmental impacts and are considered to have the greatest potential to drive environmental change

The extent to which mining operational activities act as drivers of environmental change depends in part on the type, scale, duration and magnitude of the activities, and the sensitivity of the receiving environment

Potential Activities	Applicable to operation
Transport of ore to crusher/screening/washing plant	Not applicable
Preliminary crusher/screening/washing of ore	Not applicable
Milling and grinding of ore	Not applicable
Flotation and chemical concentration/leaching of ore and final product	Not applicable
Transport of ores to smelter	Not applicable
Stockpiling of final product	Yes but very limited

Potential environmental impacts	Category
Ground surface disturbance	Natural Vegetation
Disturbance due to noise and vibrations	NA
Dust and fumes, mine vehicles and transportation systems	NA
Discharge of contaminated water	NA
Windborne dust and radionuclides	Soil
Vapour emissions from processing	NA
Spillage of corrosive liquids	NA

- **Transport of final product to market**

Seldom associated with significant impacts on the biophysical environment

Potential Activities	Applicable to operation
Packaging/loading of final product into transportation	Not applicable
Transport of final product	Yes but very limited

Potential environmental impacts	Category
Disturbance due to noise, vibration and site illumination	NA
Dust and fumes from exposed product stockpiles	NA

Potential impact during Mine closure and post operational waste Management

Impacts often continue long after the mine has stopped production and has been closed especially if site is un-rehabilitated.

Potential Activities	Applicable to operation
Decommissioning of roads	Slim possibility
Dismantling buildings	Not applicable
Reseeding/planting of disturbed areas	Not applicable
Re-contouring pit walls/waste dumps	Yes - In absence of natural flood event
Water quality treatment	Not applicable
Fencing dangerous areas	Not applicable
Monitoring of seepage	Not applicable

Potential environmental impacts	Category
Loss of productive land for alternative uses	Natural Vegetation
Subsidence, slumping and flooding of previously mined areas	Topography
Continuing discharge of contaminants to ground and surface water via seepage	Soil
Changes in river flow regimes with sharper flow peaks and reduced dry season flows	NA
Fauna and flora habitat loss and disturbance	Topography
Windborne dust	Soil
Dangerous areas that pose health risks and possible loss of life (e.g. pits, ponds, etc.)	Topography

Significance assessment of potential impacts

- Topography

The mining operation will take place within a seasonal drainage channel and can lead to the altering of the bed, banks or characteristics of the watercourse. The excavation of the sand pit without the possibility of backfilling and the creation of stockpiles will have a significant negative impact on the visual aspect of the generally flat topography.

Duration of impact Life of mine
Probability of impact Definite for excavations and possible for stockpiles
Significance of impact Moderate

- Soil

The potential exist for ad hoc tracks to be developed. Soil compaction is also a possibility due to hauling and development of stockpiles. Soil pollution is also a possibility due to oil spills during routine maintenance of equipment.

Duration of impact Life of mine
Probability of impact Definite for excavations and possible for oil spills
Significance of impact Moderate

- Natural Vegetation

No vegetation is present within the drainage channel and no riparian vegetation is present on the banks of the drainage channel. Mining can have a potential impact on the natural vegetation outside the drainage channel due to stockpiles and track development. If we assume the worst-case scenario where stockpiles and new access are developed then a total of less than 0.5ha will be temporarily disturbed when topsoil (and its vegetation content) is removed to the topsoil berm.

Duration of impact Life of mine
Probability of impact Definite
Significance of impact Low/Insignificant

- Ground Water

It is unlikely that groundwater will be encountered in the shallow excavation, however should it be encountered the impact would be negligible given the small size of the excavation.

Oil pollution due to spills from equipment can have an impact on groundwater

Duration of impact Life of mine
Probability of impact Definite for excavations and possible for oil spills
Significance of impact Moderate

- Aesthetics Visual Impact

Due to the change in topography there is a potential for visual impact through the presence of stockpiles and the excavation. The earthmoving equipment and general activities on site can also cause visual impact. When quantifying the visual impact of the operation, such quantification must be conducted with complete isolation of the site in mind. Visual impact will thus occur through the following:

- The excavation will be visible from the N7 main road.
- The stockpiles and topsoil berms will also be visible
- The earthmoving equipment and general activities on site will also cause visual impact

Duration or impact Life of mine only when loading is taking place

Probability of impact Definite

Significance of impact Moderate

3.1.3 Assessment of potential cumulative impacts.

Due to the remote locality of this operation with no other development in close proximity and small scale no potential cumulative impacts have been identified.

3.2 Concomitant list of appropriate technical or management options

3.2.1 List of actions, activities, or processes that have sufficiently significant impacts to require mitigation.

Establishing access road to the site

Access to the river bed

Establishing surface infrastructure at the site

 Campsite/office sites

 Toilet facilities, waste water and refuse disposal

 Vehicle maintenance yard and secured storage areas

Establishing residue deposit and processing areas

 Stockpile and sand processing areas

 Processing areas and waste piles

Establishing settling and clarification ponds

3.2.2. Concomitant list of appropriate technical or management options

Establishing access road to the site

- The access road to the mining area and the camp-site/site office must be established in consultation with the landowner/tenant and existing roads shall be used as far as practicable.
- Should a portion of the access road be newly constructed the following must be adhered to:
 - The route shall be selected that a minimum number of bushes or trees are felled and existing fence lines shall be followed as far as possible.
 - Water courses and steep gradients shall be avoided as far as is practicable.
 - Adequate drainage and erosion protection in the form of cut-off berms or trenches shall be provided where necessary.
- The erection of gates in fence lines and the open or closed status of gates in new and existing positions shall be clarified in consultation with the landowner/tenant and maintained throughout the operational period.
- No other routes will be used by vehicles or personnel for the purpose of gaining access to the site.

Construction

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur. The topsoil removed shall be stored in a bund wall on the high ground side of the mining area outside the 1: 50 flood level within the boundaries of the mining area.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of access roads.
- The topsoil stored in the bund wall shall be adequately protected from being blown away or being eroded.

Operation

- The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used.
- Regular maintenance of the access road shall be to the satisfaction of the Director: Mineral Development and the road shall have an acceptable surface, be free from erosion damage and have effective drainage, preventing the impounding/ponding of water.

On Closure

- Roads that will no longer be used shall be ripped or ploughed and if necessary, appropriately prepared to ensure the re-growth of vegetation.
- Materials, which may hamper re-growth of vegetation, must be removed prior to rehabilitation and disposed of in an approved manner.

General

- No vegetation will be removed to develop tracks as experience (by other prospectors) has shown that by not removing existing vegetation from area disturbed by traffic, the impact is that the vegetation is merely flattened and that such vegetation recovers quickly. Vehicles must use the same tracks and no haphazard turning in virgin veld is to be permitted.
- Try where possible to use existing road structures.
- Maintenance of access road on the mining area:
If trucks hauling sand or other traffic, which is associated with this mining operation, are the only user of access roads, then maintenance of the access road will be the sole responsibility of the holder of the mining authorization.
- In the case of dual or multiple uses of access roads by other users, arrangements for multiple responsibilities must be made with the other users. If not, the maintenance of access roads will be the responsibility of the holder of the mining permit.
- Newly constructed access roads shall be adequately maintained so as to minimize dust, erosion or undue surface damage.

Access to the river bed and mining within the river bed

- The position of the river access together with all planned future access points must be indicated on the layout plan.
- The location of the access to the river channel across the riverbank shall be at a point of the river bank where the least excavation and damage to vegetation will occur, and shall not be wider than that which is reasonably required.

- Mining will not be conducted closer than 1.5 times the height of the bank from the edge of the river channel and in such a manner that the stability of the bank of the river is not affected.
- In the case of areas that exclude mining through a special condition, no mining shall take place in these areas and mining shall not be conducted within 100m of these areas.
- Apply for a water use licence for altering the bed, banks or characteristics of a watercourse if necessary. In this case it is covered by a general authorisation (refer to general below)

Construction

- Adequate precaution shall be taken that the affected section of the bank of the river is adequately protected from scour or erosion.

Operation

- Access to the riverbed or for the purpose of mining; conducting excavations; launching pump rafts, etc, shall be through the use of only one access at a time.
- When constructing the access across the bank of the river, the top seed bearing layer of soil will be removed to a depth of 500 mm and stored in a soil dump not less than 20 m away from the channel of the river.
- When rehabilitating the access point, the original profile of the river bank will be re-established through backfilling the access point with the original material excavated or other suitable material.
- The rest of the bank will be profiled to promote re-vegetation and prevent erosion.
- The canalisation/redirection of the flow of the river over different parts of the riverbed shall be made in such a manner that the following is adhered to at all times.

That the flow of the river is not impeded in anyway and that damming upstream does not occur.

That the redirection of the flow does not result in scour or erosion of the river.

That well points or extraction pumps in use by other riparian users are not interfered with or that canalisation does not impede the extraction of water from these points.

On Closure

- The goal of rehabilitation, with respect to the area from which the sand has been extracted, is to leave the area level and even, containing no foreign debris or other materials, and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow.
- All scrap, and other foreign materials shall be removed from the bed of the river and disposed of as per other refuse, whether these accrue from the mining operation or are washed on to the site from upstream.
- Removal of these materials shall be on a continuous basis while the mine is operating and not only at the start of rehabilitation.
- Tailings in the form of boulders, rocks or oversized gravel screened out during the mining of sand will be spread over as wide a portion of the mined river bed as possible or, if buried, shall be covered by a minimum of 500 mm of sand, if at all practically possible.
- Where reeds or other riverine vegetation has been removed from areas for the mining of sand, these shall be systematically re-established in the approximate areas they occurred before mining.

- An effective control programme for the eradication of invader species and other alien plants may be required

General

- The mining of sand shall only take place within the approved demarcated mining area.
- Mining will be limited to the areas indicated as excavations on the mine plan.
- The mining area must be clearly demarcated by means of beacons at its corners, and along its boundaries if there is no visibility between the corner beacons.
- If riverine vegetation is present in the form of reeds or wetland vegetation, the presence of these areas must be indicated on the layout plan. On assessment of the application, the Regional Manager may limit the mining of sand in these vegetated areas or other portions of these areas as a special condition of the mining authorization.
- Final acceptance of the rehabilitated river access points will only be awarded after the vegetation has re-established to a point where the Director: Mineral Development is satisfied that the river bank is stable and able to withstand high river flow conditions.
- Damage may occur from a situation where high floodwaters scour and erode access points in the process of rehabilitation over the riverbank or an access point presently in use. In these events, repair of such damage shall be the sole responsibility of the holder of the mining authorization.
- Repairs to the riverbank should ensure the reinstatement to its original profile immediately after such event has occurred and the river has subsided to a point where repairs can be undertaken.
- A small-scale miner must get the appropriate water use authorisation in respect of the proposed water uses that will take place with mining. Exceptions include Schedule 1 water uses (e.g. reasonable domestic use), or those that fall under a General Authorization.
- A person may only use water without a licence if that water use is permissible under Schedule 1, if that water use is permissible as a continuation of an existing lawful use; or if that water use is permissible in terms of a general authorization.

Establishing surface infrastructure - campsite/office, toilet facilities, waste water and refuse disposal and vehicle maintenance yard and secured storage areas

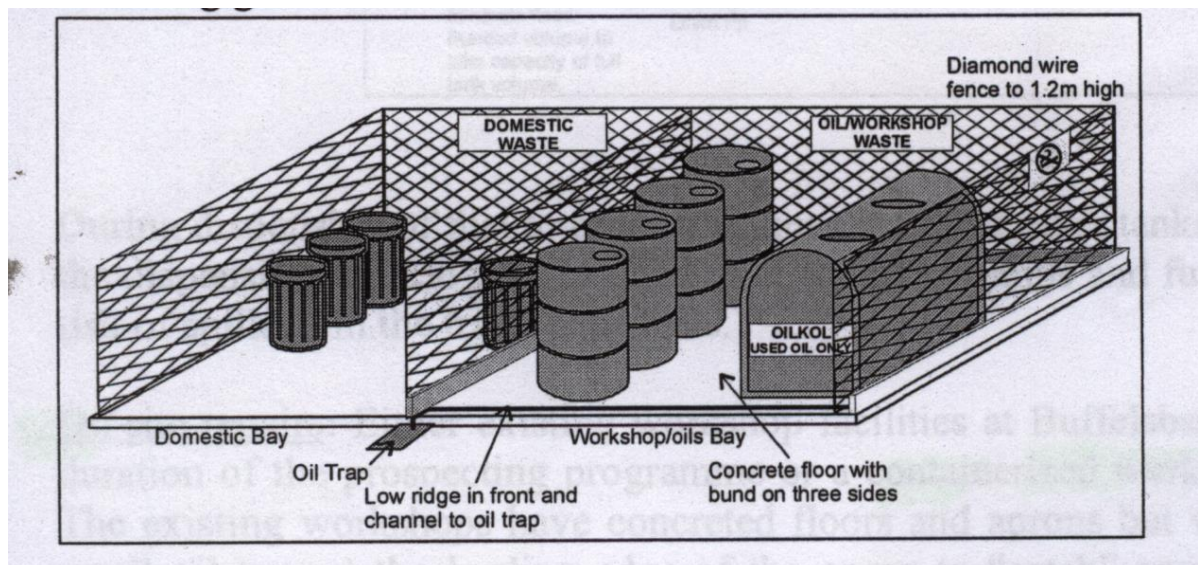
- No camp or office site shall be located closer than 100 metres from a stream, spring, dam or pan.
- Chemical toilet facilities (preferred) or other approved toilet facilities such as a septic drain shall be used and sited on the camp site in such a way that they do not cause water or other pollution.
- The vehicle maintenance yard and secured storage area will be established outside of the flood plain, above the high flood level mark within the boundaries of the mining area.

Construction

- The area chosen for these purposes shall be the minimum, reasonably required for the purpose, and which will involve the least disturbance to the vegetation.
- Prior to development of the approved area, the top seed-bearing layer of soil to a depth of 500 mm shall be removed and stored in a bund wall on the high ground side of the area. The height of this bund wall shall not exceed 1.5 metres.

- In cases where toilet facilities are linked to existing sewerage structures, all necessary regulatory requirements concerning construction and maintenance shall be adhered to.
- The storage areas/buildings shall be securely fenced and all hazardous substances and stocks such as diesel, oils, detergents etc. shall be stored therein. Drip pans, a thin concrete slab or a PVC lining shall be installed in such storage areas/ buildings viz. bunded area.
- Any vehicle maintenance yard and secured storage area will be established as far as is practicable, outside the flood plain, above the 1 in 50 flood level mark within the boundaries of the mining/prospecting area.
- The area chosen for these purposes will be the minimum reasonably required and involve the least disturbance to tree and plant life
- The storage area shall be securely fenced and all hazardous substances and stocks such as diesel, oils, detergents, etc., shall be stored therein. Drip pans, a thin concrete slab or a facility with PVC lining, shall be installed in such storage areas with a view to prevent soil and water pollution.
- The location of both the vehicle maintenance yard and the storage areas are to be indicated on the layout plan.
- No vehicle may be extensively repaired in any place other than in the maintenance yard.
- The maintenance of vehicles and equipment used for any purpose during the mining operation will take place only in the maintenance yard area.
- Equipment used in the mining process will be adequately maintained so that during operations it does not spill oil, diesel, fuel, or hydraulic fluid.
- Machinery or equipment used on the mining area will not be allowed to constitute a pollution hazard in respect of the above substances.
- The Regional Manager may order such equipment to be repaired or withdrawn from use if he or she considers the equipment or machinery to be polluting and irreparable.

Figure 1: Proposed layout of temporary waste storage area



Operation

- All effluent water from the camp washing facility shall be disposed of in a properly constructed French drain, situated as far as possible, but not less than 100 metres, from a stream, river pan, dam or borehole.

- Only domestic type water shall be allowed to enter this drain and any effluents containing oil, grease or other industrial substances shall be collected in a suitable receptacle and removed from the site, either for resale or for appropriate disposal at a recognised facility.
- Spills should be cleaned up immediately by removing the spills together with the polluted soil and disposing thereof at a recognised facility to the satisfaction of the regulators.
- Non-biodegradable refuse (such as glass bottles, plastic bags metal, scrap, etc.) shall be stored in a container at a collecting point and collected on a regular basis and disposed of at an authorised disposal facility. Precautions shall be taken to prevent any refuse from spreading on and from the campsite.
- Biodegradable refuse generated from the camp site, vehicle yard, storage area or any other area shall either be handled as above or be buried in a pit excavated for that purpose and by covering it with layers of soil, incorporating a final 0,5 metre thick layer of topsoil (if practical) or as specified by the local authority, if applicable.
- Suitable covered receptacles shall be provided and conveniently placed for waste disposal. All used oils, grease or hydraulic fluid shall be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a recognized or licensed disposal facility.

On Closure

- On completion of mining, all buildings, structures or objects on the camp/office sites, shall be completely removed (unless new uses of the building have been agreed) and the site should be fully rehabilitated.
- On completion of mining, the campsite/office site will be rehabilitated through the removal of all facilities, waste and any other feature constructed or established during use of the campsite.
- All areas, devoid of vegetation/grass or where soils have been compacted due to traffic, shall be scarified or ripped and, if necessary appropriately ensure the regrowth of vegetation.
- French drains shall be compacted and covered with a final layer of topsoil to a height of 10 cm above the surrounding ground surface.

General

- Only one mobile chemical toilet will be available for use during operations that will be removed at final closure
- Equipment used in the mining process, particularly in the bed of the river, must be adequately maintained, such that during operation they do not spill oil, diesel, fuel or hydraulic fluid.

Establishing residue deposit and sand processing areas and waste piles

- Stockpiles and sand processing areas for the mined sand products shall not be established within 20 metres of the edge of the river channel.
- Processing areas and waste piles shall not be established within 100m of the edge of any river channel or other water bodies.
- The areas chosen for this purpose shall be the minimum reasonably required and that which will involve the least disturbance to vegetation.

Construction

- The location and dimensions of the area are to be indicated on the layout plan and once established, all stockpiling and further processing of sand will be

confined to these areas and no stockpiling or processing will be permitted in areas not correctly prepared.

- New stockpile sites will be GPS located and pegged with steel droppers. The site will be inspected and photographed prior to any disturbance.
- The stockpile area needs to be demarcated to restrict operations to within the demarcated area.
- Prior to development of the approved area, the top seed-bearing layer of the soil shall be removed to a depth of 500 mm and stored in a bund wall on the high ground side of the area keeping disturbance to the native vegetation to an absolute minimum. The height of this stockpile wall shall not exceed 1.5 metres.

Operation

- The river bed may serve as a stockpile area for sand products or for products awaiting further treatment, provided such stockpiles are at least 10 metres away from water flowing within the river bed.
- The stockpiles in the riverbed shall further be limited to no more than 24 hours average production, and placed in such manner that the least impedence of flow will be experienced should the level of the river rise. If the mining of sand is temporarily suspended for any reason, the stockpiles within the bed of the river must be flattened until operations are resumed.
- Any waste material generated from the mining of sand in the riverbed will be dealt with as described above.
- Topsoil borrowing from the virgin areas to cover disturbed areas will not take place and movement of vehicles will be restricted to demarcated areas so as to keep the footprint of the mining operation to the absolute minimum.
- At final closure all product needs to be removed from the stockpile areas and where product is mixed in with the subsoil the subsoil will also be removed.

On Closure

- On completion of mining, the surface of the stockpile and processing areas outside the riverbed shall be scarified to a depth of at least 500 mm, graded even and the topsoil previously stored adjacent to the site in a bund wall returned to its original depth over the area.
- The area shall be appropriately prepared, if necessary, (e.g. fertilized and seeded), to ensure the regrowth of vegetation.

General

- Where a depression in the ground in which water can gather has formed, attention will be given to the outflow of water to prevent concentration of the run-off and thus prevent erosion.
- Stockpiles must be protected and not compacted.
- Tailings from the extraction process must be so treated and /or deposited that it will in no way prevent or delay the rehabilitation process.

Establishing settling and clarification ponds

Ponds are usually established for two basic purposes, viz.:

Settling ponds: As a primary facility, to allow drainage of sand, when pumped from the bed of the river.

Clarification ponds: To serve as a facility to settle fines this will allow the effluent to be returned to the river.

- The settling ponds shall not be located within the flood plain and will be sited in such a manner so as to cause the least disturbance to vegetation.

- Design, construct, maintain and operate any dam or tailings dam that forms part of dirty water systems to have a minimum freeboard of 0.8 metres above the full supply level.
- The position of the ponds, their size, depth and distance from the edge of the river channel shall be indicated on the layout plan.
- The final clarification pond shall be sized such that water discharged conforms to the water quality objectives in terms of the National Water Act, 1998 (Act 36 of 1998).
- Apply for a water use licence whenever disposing of waste in a manner that may detrimentally impact on a water resource.

Construction

- After the position of the ponds and their size has been approved, the area is to be stripped of top seed bearing layer of soil to a depth of 500 mm. This soil thus removed shall be stored on the high ground boundary of the area in the form of a bund wall.
- Construction of the pond walls shall be from material excavated from within the area of the pond. The walls of the pond shall be constructed level and be given an overflow consisting of sized pipes installed a minimum of 800 mm down from the top of the wall (i.e. 800 mm freeboard) and of length to discharge fully into the next pond.
- In the case of the final clarification pond, the overflow pipes will be of such length that they discharge not less than 1.5 metres into the river.
- Under no circumstances will the overflow from one pond to another, or from the final clarification pond to the river be allowed to flow across the ground or in excavated earth trenches.

Operation

- Erosion damage to the pond walls from rain or spills will be repaired and filled in on a regular basis.
- Screen tailings: tailings from screens used at the settling ponds shall be collected and may be used as road fill.

On Closure

- Settling ponds will be rehabilitated after first spreading tailings from the tailings dump evenly over the floor of the ponds, should this be the method chosen to rehabilitate tailings.
- The tailings will then be covered through spreading the previously excavated material from the pond's wall evenly over the area.
- The topsoil previously stored adjacent to the site shall then be returned to its original depth over the area.
- The area shall be appropriately prepared, if necessary, to ensure the re-growth of indigenous vegetation.

General

- Construction of one pond will only be allowed, if the overflow from this pond has been clarified and that the level of suspended matter of this overflow is within the local catchment standard, allowing the water to be returned to the river.
- In considering the above two basic uses, it is very seldom that the construction of only one pond will suffice. In virtually all cases one pond is required for processing or drainage and the second to clarify. (Monitoring and quality testing of this water will be required on a regular basis, as determined by the Department of Water Affairs and Forestry.)

Ancillary management and mitigating requirements

Fuel receipt, storage and dispensing:

In the management of fuel supply, receipt, storage and use, the following procedures will be followed, cautions taken and facilities built to properly manage this operational sector:

- The fuel delivery bowser driver will be cautioned to adhere to safe driving speeds and drive cautiously on the 10km of gravel roads from the main tanks at the processing plant to the northern prospecting site.
- The fuel tank at the processing plant must be developed according to the following design guidelines:
Construction of a bund wall capable of holding the full capacity of the mobile tanks parked within it.
Construction of a concreted floor or PVC facility.
Construction of a concreted or PVC service apron sufficiently large to catch fuel spills during receipt and supply of fuel.
Such apron to be dished to lead rain-water or wash-water to drain pit (sump) for collection of oily-run-off and suitable decontamination disposal thereof.
- During dispensing of fuel to other facilities (plant, and other tanks) or field vehicles via tanker, the dispensing vehicle is to be fitted with suitable pumps and funnel extensions to reduce the risk of spillage in the transfer of fuels.

Emergency repairs on site:

In the event of a breakdown repair being required in the field, the staff should be trained in use of drip trays and suitable funnels (not to drain oil into the sand) for filling and draining of lubricants and the staff shall be provided with such equipment to prevent oil contamination.

In addition:

- Used/replaced filters, hoses, belts, cloths, etc. are to be placed in a bin for return to the used oil and lubricant storage area which is to be constructed as shown above. Used filters are not to be buried at the site of repair (nor discarded in the excavation to be backfilled).
- In the event of soil contamination, the soils are to be treated with a suitable decontaminant such as the OT8 product range or Spillsorb or similar product.
- All staff involved in mobile plant operation and maintenance is to be made aware of these oil and lubricant procedures. Staff will require instruction in the:
Deleterious effects of oil / fuel on the environment
Neutralization of oil leaks on the concrete apron,
The operation of the oil trap (including the storage of trapped oil); and
Use of OT8/Spillsorb products.
- All operators are to check their equipment for leaks and report such leaks on a daily basis.
- No used oils are to be used as dust suppressants on manoeuvring areas.

Storm Water Management

There are four primary principles that need to be applied in the development and implementation of a storm water management plan:

- Clean water must be kept clean and be routed to a natural watercourse by a system separate from the dirty water system while preventing or minimizing the risk of spillage of clean water into dirty water systems.

- Dirty water must be collected and contained in a system separate from the clean water system and the risk of spillage or seepage into clean water systems must be minimized.
- The storm water management plan (SWMP) must be sustainable over the life cycle of the mine and over different hydrological cycles and must incorporate principles of risk management.
- The statutory requirements of various regulatory agencies and the interests of stakeholders must be considered and incorporated.

Erosion and Sediment Control

Successful control of erosion and sedimentation from mining activities should involve a system of best management practices, which targets each stage of the erosion process.

- The most efficient approach involves minimizing the potential sources of sediment from the outset. This means limiting the extent and duration of land disturbance to the minimum needed, and protecting surfaces once they are exposed.
- The second stage of the best management practice system involves controlling the amount of runoff and its ability to carry sediment by diverting incoming flows and impeding internally generated flows.
- The third stage involves retaining sediment, which is picked up on the project site through the use of sediment capturing devices. On most sites successful erosion and sedimentation control requires a combination of structural

3.3 Review the significance of the identified impacts

The potential significant impacts as identified in paragraph 3.1 after implementation of the proposed mitigation measures and management options in paragraph 3.2. can all be regarded as insignificant.

4 REGULATION 52 (2) (d): Financial provision.

4.1 Plans for quantum calculation purposes.

Refer diagram 4 and 5 above.

4.2 Alignment of rehabilitation with the closure objectives

The environment affected by the mining operations shall be rehabilitated, as far, as is practicable, to its natural state. Land use will be the same as before mining with the same production with regard to grazing. The affected environment shall be 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. When rehabilitating the access point the original profile of the riverbank will be re-established by back filling the access point with the original material excavated or other suitable material.

The rest of the bank will be profiled to promote re-vegetation and prevent erosion.

The goal of rehabilitation with respect to the area where mining has taken place in the flood plain is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow. All scrap and other foreign materials will be removed from the site and disposed of as in the case of

other refuse, whether these accrue directly from the mining operation or are washed on to the site from upstream.

Removal of these materials shall be done on a continuous basis and not only at the start of rehabilitation.

All roads used will be repaired or rehabilitated if not needed by the landowner. All stockpiles will be removed and areas compacted by hauling operations will be ripped and profiled. The mitigating measures described in paragraph 3 are compatible with these closure objectives.

4.3 Quantum calculations.

The area will be rehabilitated with the original land use namely small stock farming in mind. The productivity of the area after closure will be the same as before the start of the mining operation. Rehabilitation cost was estimated with the proposed end-state in mind.

4.3.1 Rehabilitation of access roads

No access roads will be constructed by the holder of the permit. Existing access roads will be used and maintained by the applicant. The road will not be decommissioned as it will still be needed by the landowner

4.3.2 Rehabilitation of the office/camp site, vehicle maintenance yard and secured storages areas

No camp sites will be constructed as services will be obtained within Steinkopf.

4.3.3 Rehabilitation of excavation area

After mining the whole excavation area can be regarded as part of the dry river-bed. The goal of rehabilitation with respect to the area is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow.

All scrap and other foreign materials will be removed from the bed of the river and disposed of as in the case of other refuse whether these accrue directly from the mining operation or are washed on to the site from upstream.

No reeds or other riverine vegetation occur in the proximity of the dry river bed except for *Accasia karoo* trees that can be seen as riparian vegetation.

An effective control programme for the eradication of invader species and other exotic plants shall be instituted on a regular basis over the entire mining area under the control of the holder of the mining permit, both during mining and at the stage of final rehabilitation. Rocks and coarse material removed from the excavation will be spread evenly over the bed of the river.

Extent:	1.5 Ha
Duration of rehabilitation:	16 hours
Equipment required:	
Front end loader for removal of stockpile and overburden dump	
16 h X R500.00/h	R 8 000.00
Ripping and profiling	
16 h X R500.00/h	R 8 000.00
Cost of rehabilitation:	R16 000.00

4.3.4 Rehabilitation of processing areas

No processing areas will be present only limited stockpiling areas. The existing stockpile area will be used and no new virgin area will be disturbed by stockpiling. The stockpiling area will form part of rehabilitation and will be included in the fenced off area.

4.3.5 Final rehabilitation

All equipment and other items used during the mining period will be removed from the site. Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the mining area and disposed of at a recognised landfill facility. It will not be buried or burned on the site.

Extent:	1.5 Ha
Duration of rehabilitation:	4 hours
Equipment require:	
Transport of material	R 2 000.00
Cost of rehabilitation:	R 2 000.00

4.3.6 Total cost of rehabilitation:

Rehabilitation of excavation area	R16 000.00
Final rehabilitation	R 2 000.00
Total	R18 000.00

The applicant is willing to escalate the estimated amount of R18 000.00 to R20 000.00 and financial provision required under Regulation 54 for the amount of R20 000.00 that is more than is necessary for the rehabilitation of damage caused by the operation, both at sudden closure or at final, planned closure will be furnish to DME in the form of a bank guarantee.

4.4 Undertaking to provide financial provision

Financial provision required under Regulation 54 for the amount of R 20 000.00 will be furnish to DME. The quantum will be updated again within a year or at a shorter interval if there is any deviation from the prospecting work program.

5 REGULATION 52 (2) (e): Planned monitoring and performance assessment of the environmental management plan.

5.1 List of identified impacts requiring monitoring programmes.

None of the impacts identified required specific monitoring programs but inspections and monitoring shall be carried out on both the implementation of the program and the impact on the natural and cultural environment. Visual inspections on erosion and physical pollution shall be carried out on a regular basis together with fixed point photography.

5.2 Functional requirements for monitoring programmes

Every aspect of the operation must be checked against the prescriptions given in this document and if find that certain aspects are not addressed or impacts on the environment are not mitigated properly, the identified inadequacies will be rectified immediately.

Regular monitoring of all the environmental management measures and components shall be carried out to ensure that the provisions of this program are adhered to.

Layout plans will be updated on a regular basis and updated copies will be submitted on an annual basis to the Regional Manager.

Reports confirming compliance with various points identified in this program will be submitted to the Regional Manager on an annual basis together with an update of the rehabilitation cost. Any emergency or unforeseen impact will be reported as soon as possible. An assessment of environmental impacts that were not properly addressed or were unknown when the program was compiled shall be carried out and added as a corrective action.

5.3 Roles and responsibilities for the execution of monitoring programmes

The project manager will be responsible for monitoring and Reports confirming compliance with various points identified in the environmental management program.

5.4 Committed time frames for monitoring and reporting

The project manager must on a bi-monthly basis, check every aspect of the operation against the prescriptions given in this document and, if find that certain aspects are not addressed or impacts on the environment are not mitigated properly, the project manager must rectify the identified inadequacies immediately.

6 REGULATION 52 (2) (f): Closure and environmental objectives.

6.1 Rehabilitation plan

The environment affected by the mining operations shall be rehabilitated, as far, as is practicable, to its natural state. Land use will be the same as before mining with the same production with regard to grazing. The affected environment shall be 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. When rehabilitating the access point the original profile of the riverbank will be re-established by back filling the access point with the original material excavated or other suitable material.

The rest of the bank will be profiled to promote re-vegetation and prevent erosion.

6.2 Closure objectives and their extent of alignment to the pre-mining environment

The goal of rehabilitation with respect to the area where mining has taken place in the flood plain is to leave the area level and even, and in a natural state containing no foreign debris or other materials and to ensure the hydrological integrity of the river by not attenuating or diverting any of the natural flow. All scrap and other foreign materials will be removed from the site and disposed of as in the case of other refuse, whether these accrue directly from the mining operation or are washed on to the site from upstream.

Removal of these materials shall be done on a continuous basis and not only at the start of rehabilitation.

All roads used will be repaired or rehabilitated if not needed by the landowner. All stockpiles will be removed and areas compacted by hauling operations will be ripped and profiled. The mitigating measures described in paragraph 3 are compatible with these closure objectives.

6.3 Confirmation of consultation

A copy of the consultation report that includes environmental objectives in relation to closure was made available to the landowner and all other interested parties for comment. All comments received were addressed in this EMPR.

7 REGULATION 52 (2) (g): Record of the public participation and the results thereof.

7.1 Identification of interested and affected parties.

7.1.1 Name the community or communities identified, or explain why no such community was identified.

The community of Concordia is the registered landowner of the Remainder of the Farm Steinkopf by virtue of title deed G289/1953. The lawful occupier is however the community of Steinkopf and the land is managed by the local authority Nama Khoi Municipality on behalf of the community of Steinkopf.

7.1.2 Specifically state whether or not the Community is also the landowner. Refer 1.1 above.

7.1.3 State whether or not the Department of Land Affairs been identified as an interested and affected party.

The property is registered in the name of the local community and not the Republic of South Africa therefore the Department of Land Affairs was not identified as an interested and affected party only the local authority representing the local community.

7.1.4 State specifically whether or not a land claim is involved. No land claim is registered against the property.

7.1.5 Name the Traditional Authority identified No Traditional Authority only local municipality

7.1.6 List the landowners identified by the applicant. (Traditional and Title Deed owners)

The community of Concordia is the registered landowner of the Remainder of the Farm Steinkopf No 22 by virtue of title deed G289/1953. The lawful occupier is however the community of Steinkopf and the land is managed by the local authority Nama Khoi Municipality on behalf of the community of Steinkopf.

7.1.7 List the lawful occupiers of the land concerned.

The lawful occupier is the community of Steinkopf and the land is used by the community for grazing. The land is managed by the local authority Nama Khoi Municipality on behalf of the community of Steinkopf.

7.1.8 Explain whether or not other persons' (including on adjacent and non-adjacent properties) socio-economic conditions will be directly affected by the proposed prospecting or mining operation and if not, explain why not.

The only other land use in the area is small stock grazing and due to the small extends of the mining area there will be no impact on productivity. The area is also disturbed by historic sand mining activities.

7.1.9 Name the Local Municipality identified by the applicant
Nama Khoi Municipality

7.1.10 Name the relevant Government Departments, agencies and institutions responsible for the various aspects of the environment and for infrastructure which may be affected by the proposed project.

Department Mineral Resources as leading agency

Department Environment and Conservation responsible for scrutinizing all EMP's for new developments.

No listed activity in terms of Nema will take place.

No water use that required registration or a water use license will take place.

No infrastructure is in close proximity of the mining operation.

7.1.11 Submit evidence that the landowner or lawful occupier of the land in question, and any other interested and affected parties including all those listed above, were notified.

A copy of this document was supplied to the following I&A parties and/or personal communication has taken place.

- Nama Khoi Municipality representing the broader community - Confirmation attached

- All other interested parties were invited to comment on the proposed project by means of an advertisement in the local newspaper – Confirmation attached

All comments were supposed to be directed to the regional director DMR with copies to the applicant. No comments were received.

7.2 The details of the engagement process

7.2.1 Description of the information provided to the community, landowners, and interested and affected parties.

A copy of the consultation report was supplied and or explained to them.

7.2.2 List of which parties identified in 7.1 above that were in fact consulted, and which were not consulted.

Local authority as landowners and advertisement to invite other interested and affected parties.

7.2.3 List of views raised by consulted parties regarding the existing cultural, socio-economic or biophysical environment.

All comments received on the content of the consultation report were included and addressed in this EMP. Letters of agreement and/or comments from I&A parties with regard to the content of the consultation template was supplied as part of proof of the consultation process.

7.2.4 List of views raised by consulted parties on how their existing cultural, socio-economic or biophysical environment potentially will be impacted on by the proposed prospecting or mining operation.

All comments received on the content of the consultation report were included and addressed in this EMP. Letters of agreement and/or comments from I&A parties with

regard to the content of the consultation template was supplied as part of proof of the consultation process.

7.2.5 Other concerns raised by the aforesaid parties.
None received during the consultation process.

7.2.6 Confirmation that minutes and records of the consultations are appended.
Letters of agreement and/or comments from I&A parties with regard to the content of the consultation template was supplied as part of proof of the consultation process.

7.2.7 Information regarding objections received.
No objections that needs to be handled by the REMDEC committee were received during the consultation process

7.2.8 The manner in which the issues raised were addressed.
All comments received on the content of the consultation report were included and addressed in this EMP.

8 SECTION 39 (3) (c) of the Act: Environmental awareness plan.

8.1 Employee communication process

General environmental awareness will be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This will ensures that environmental accidents are minimized and environmental compliance maximized.

Environmental awareness will be fostered in the following manner:

- a) Induction course for all workers on site, before commencing work on site.
- b) Refresher courses as and when required
- c) Daily toolbox talks at the start of each day with all workers coming on site, where workers can be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.
- d) Taking part in national and international environmental campaigns like National Marine Week, National harbour day, National Wetlands day exacta.
- e) Displaying of information posters and other environmental awareness material in the general assembly points.

8.2 Description of solutions to risks

Specific environmental awareness performance criteria will form part of the job descriptions of employees, to ensure diligence and full responsibility at all levels of the organisational work force.

General environmental awareness will be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This will ensures that environmental accidents are minimized and environmental compliance maximized.

8.3 Environmental awareness training.

The goal of training is to enable a shared understanding and common vision of the environment, the impact of a mining operation on the environment (and why this is important) and the role of mining personnel in terms of environmental management and compliance.

The induction course will compose of the following steps:

- The first step will include background discussion of the environment concept: of what it comprises and how we interact with it.
- The second step will be a description of the components and phases of the specific mining operation.
- The third step will be a general account of how the mining operation and its associated activities can affect the environment, giving rise to what we call Environmental Impacts.
- The fourth and most important step will be a discussion of what staff can do in order to help prevent the negative environmental impacts from degrading our environment. This is known as Environmental Impact Management.

9 SECTION 39 (4) (a) (iii) of the Act: Capacity to rehabilitate and manage negative impacts on the environment.

9.1 The annual amount required to manage and rehabilitate the environment. A budget of R40 000 per year was made available for compliance reporting including the updating of layout plans and performance assessment on the implementation of the EM Programme and update of quantum of financial provision. This amount will also be adequate for progressive rehabilitation of the mining operation. In addition to this amount for progressive rehabilitation a financial guarantee of R20 000 will be supplied to DMR for final rehabilitation and closure of the operation.

9.2 Confirmation that the stated amount correctly reflected in the Mine Work Programme as required.

The budget referred to in 9.1 was provided for in the Environmental cost estimate table 2 of the financial and technical competence report submitted as part of the application for a mining permit in terms of Section 29 (a) and proof of access to the necessary funds were supplied with the application.

10 REGULATION 52 (2) (h): Undertaking to execute the environmental management plan.

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

Full Names and Surname	John Frederick Cloete
Identity Number	6510135104083

-END-