ENVIRONMENTAL IMPACT ASSESSMENT

A “significant impact” is defined as it is defined in the EIA Regulations (2014): “an impact that may have a notable effect on one or more aspects of the environment or may result non-compliance with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as by its duration, magnitude, intensity or probability of occurrence”. The objective of this EIA methodology is to serve as framework for accurately evaluating impacts associated with current or proposed activities in the biophysical, social and socio-economical spheres. It aims to ensure that all legal requirements and environmental considerations are met in order to have a complete and integrated environmental framework for impact evaluations.

1. IMPACT ASSESSMENT METHODOLOGY

The process of determining impacts to be assessed is one of the most important parts of the environmental impact assessment process. It is of such high importance because the environmental impacts identified can and are often linked to the same impact stream.

In this method all impacts on the biophysical environment are assessed in terms of the overall integrity of ecosystems, habitats, populations and individuals affected. The Environmental Impact Assessment (EIA) 2014 Regulations promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) [as amended] requires that all identified potential impacts associated with the proposed project be assessed in terms of their overall potential significance on the natural, social and economic environments.

The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact;
- Frequency of the Impact;
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

Greenmined Environmental has developed an impact assessment methodology (as defined below) whereby the significance of a potential impact is determined through the assessment of the relevant temporal and spatial scales determined of the extent, magnitude and duration criteria associated with a particular impact.

This method does not explicitly define each of the criteria but rather combines them and results in an indication of the overall significance.

DEFINITIONS AND CONCEPTS:

Environmental significance:

The concept of significance is at the core of impact identification, evaluation and decision-making. The concept remains largely undefined and there is no international consensus on a single definition. The following common elements are recognised from the various interpretations:

- Environmental significance is a value judgement;
- The degree of environmental significance depends on the nature of the impact;
- The importance is rated in terms of both biophysical and socio-economic values; and
- Determining significance involves the amount of change to the environment perceived to be acceptable to affected communities.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of acceptability) (DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5).

The concept of risk has two dimensions, namely the consequence of an event or set of circumstances, and the likelihood of particular consequences being realised (Environment Australia (1999) Environmental Risk Management).

1.1. Nature of the impact

The nature of an impact can be defined as "a brief description of the impact being assessed, in terms of the proposed activity or project, including the socio-economic or environmental aspect affected by this impact".

1.2. Extent of the impact

The extent of an impact can be defined as "a brief description of the spatial influence of the impact or the area that will be affected by the impact".

Table 1: Determining the extent of an impact

EXTENT Extent or spatial influence of impact	**Footprint**	Only as far as the activity, such as footprint occurring within the total site area
	Site	Only the site and/or 500m radius from the site will be affected
	Local	Local area / district (neighbouring properties, transport routes and adjacent towns) is affected
	Region	Entire region / province is affected
	National	Country is affected

1.3. Severity of the impact

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 2: Rating of Severity

Type of criteria	**Rating**				
	1	**2**	**3**	**4**	**5**
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant/ Harmful	Great/ Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance/ Easily reversible	Low cost to mitigate	Substantial cost to mitigate/ Potential to mitigate impacts/ Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate/ Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

1.4. Duration of the impact

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 3: Rating of Duration

Rating		**Description**
1	Very Short Term	Up to three months (quarter) after construction
2	Short Term	Three months to one year after construction
3	Medium Term	One year to six years after construction
4	Long Term	Six to ten years after construction
5	Permanent	Beyond ten years after construction

1.5. Probability of the impact occurring

The probability of an impact can be defined as “the estimated chance of the impact happening”. Probability refers to how often the activity or aspect has an impact on the environment.

Table 4: Determining the probability of an impact

PROBABILITY	**1**	Almost never / almost impossible	*Impossible* to occur (0 – 20% probability of occurring)

	2	Very seldom / highly unlikely	*Unlikely* to occur (20 -40% probability of occurring)
	3	Infrequent / unlikely / seldom	*May* occur (40-60% chance of occurring)
	4	Often / regularly / likely / possible	*Likely* to occur (60-80% chance of occurring)
	5	Daily / highly likely / definitely	Will *certainly* occur (80-100% chance of occurring)

1.6. Degree to which impact can be reversed

The reversibility of an impact can be defined as "the ability of an impact to be changed from a state of affecting aspects to a state of not affecting aspects".

Table 5: Determining the reversibility of an impact

REVERSIBILITY	**Reversible**	Impacts can be reversed through the implementation of mitigation measures
	Irreversible	Impacts are permanent and can't be reversed by the implementation of mitigation measures

1.7. Determination of Likelihood:

The irreplaceability (likelihood) of an impact can be defined as "the amount of resources that can/can't be replaced". The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in tables 6 and 7.

1.8. Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Example of calculating Overall Likelihood

Consequence	**Rating**
Duration	Example 4
Probability	Example 2
SUBTOTAL	**6**
TOTAL LIKELIHOOD **(**Subtotal divided by 2)	**3**

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Rating of Frequency:

Rating	**Description**
1	Once a year or once/more during operation
2	Once/more in 6 Months
3	Once/more a Month
4	Once/more a Week
5	Daily

1.9. Determination of Overall Environmental Significance:

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence X Overall Likelihood

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of **LOW**, **LOW-MEDIUM**, **MEDIUM**, **MEDIUM-HIGH** or **HIGH**, as shown in the table below.

Significance or Risk	**Low**	**Low-Medium**	**Medium**	**Medium-High**	**High**
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Based on the above, the significance rating scale has been determined as follows:

High	Of the highest order possible within the bounds of impacts which could occur. In the case of negative impacts, there would be no possible mitigation and / or remedial activity to offset the impact at the spatial or time scale for which it was predicted. In the case of positive impacts, there is no real alternative to achieving the benefit.
Medium-High	Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
Medium	Impact would be real but not substantial within the bounds of those, which could occur. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible, in case of positive impacts; other means of achieving these benefits would be about equal in time, cost and effort.
Low-Medium	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved of little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
Low	Impact would be negligible. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit
Insignificant	There would be a no impact at all – not even a very low impact on the system or any of its parts.

1.10. Determination of Overall Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: ***Severity/Intensity, Duration and Extent/Spatial Scale***. Each factor is assigned a rating of 1 to 5, as described in the tables above.

1.11. Degree to which the impact can be mitigated

The degree to which an impact can be mitigated can be defined as "the effect of mitigation measures on the impact and its degree of effectiveness".

Table 6: Determining the mitigation rating of an impact

MITIGATION RATING	**MITIGATED Degree impact can be mitigated**	High	*Impact 100% mitigated*
		Medium	*Impact >50% mitigated*
		Low	*Impact <50% mitigated*

1.12. Cumulative Impacts

The effect of cumulative impacts can be described as "the effect the combination of past, present and "reasonably foreseeable" future actions have on aspects".

Table 7: Determining the confidence rating of an impact

CUMULATIVE RATING	**CUMULATIVE EFFECTS**	Low	*Minor* cumulative effects
		Medium	*Moderate* cumulative effects
		High	*Significant* cumulative effects

2. The positive and negative impacts that the proposed activity will have on the environment and the community that may be affected.

No alternatives sites where considered for the proposed activity as the application extends across the entire property. If the proposed drill sites are found unfeasible due to the natural environment, these drill sites will be relocated to an alternative position with minimal impacts associated. Product stockpiles to be prospected are old mining stockpiles. No other alternative sites where investigated due to limited stockpiles on site.

However, the applicant considered two activity alternatives during the planning phase of this project:

<u>Temporary Infrastructure (Preferred Alternative) vs. Permanent Temporary Infrastructure:</u>

The use of temporary Infrastructure will entail the use of machinery that is either track-based or can be removed without difficulty. Temporary Infrastructure to be used in the prospecting method will entail some temporary offices, storage facility and chemical toilet, with servicing of vehicles and equipment being done off-site at the existing workshop on the applicant's farm.

Positive Aspects: The positive aspects associated with the use of temporary infrastructure firstly enable the applicant to move the temporary infrastructure within the boundaries of the prospecting area as prospecting of the mineral progresses. Secondly the decommissioning phase is facilitated as the removal of temporary infrastructure from the prospecting area during the rehabilitation of the site is easy and highly effective.

The use of permanent infrastructure will entail the construction of an office building with ablution facilities, and installation of a permanent vehicle service area.

The use of permanent Infrastructure will increase the impact of the proposed project on the environment as it will entail the establishment of more structures, lengthen the period required for rehabilitation as well as increase the rehabilitation amount as the permanent Infrastructure will either have to be decommissioned or be maintained after the closure of the site.

The construction of permanent Infrastructure at the site will also increase the visual impact of the proposed project on the surrounding environment and additional mitigation measures will have to be implemented to address the impact.

In the light of the above the use of temporary Infrastructure is deemed to be the most viable preferred alternative.

<u>No-go Alternative:</u>

The ‘No Go’ option for development was considered. However, this was adjudged to not be the best land-use option for the following reasons: The grazing value of the land is at present considered to be extremely low due to the high level of disturbance, resulting in the area being characterized by non-palatable grasses and low biomass.

The no-go alternative was not deemed to be the preferred alternative as:

The application, if approved, would allow the applicant to utilize the available Sillimanite as well as provide employment opportunities to local employees. Should the no-go alternative be followed these opportunities will be lost to the applicant, potential employees and clients; and

The landowner will not be able to diversify the income of the property.

It is important to note that as previously discussed, that execution of the prospecting operation will not leave the land unproductive, so that the proposed prospecting operation can be considered to be a sustainable land-use option for the area. If the prospecting project does not go ahead the farm will be used for cultivating grazing and mixed farming. This is also the current use of the land in question.

<u>Positive Impacts:</u>

- The prospecting site offers the mineral sought after;
- The prospecting area can be reached by an existing farm access roads. No new road infrastructure need to be constructed;
- Due to the small size of the activity and the remote location of the prospecting area the potential impacts on the surrounding environment, associated with prospecting is deemed to be of low significance; and

- No residual waste as a result of the prospecting activity will be produced that needs to be treated on site. Any general waste that may be produced on-site will be contained in sealed refuse bins to be transported to the local municipal landfill site (Pofadder). The amount of hazardous waste to be produced at the site will be minimal and will mainly be as a result of accidental leakage. Contaminated soil will be removed to the depth of the spillage and contained in sealed bins until removed from site by a hazardous waste handling contractor to be disposed of at a registered hazardous waste handling site.

Negative Impacts:

- Due to the remote location of the prospecting area very little negative impacts on the community could be identified that were deemed to be of significant importance. The dust and noise impacts that may emanate from the prospecting area during the operational phase could have a negative impact on the surrounding community if the mitigation measures proposed in this document is not implemented and managed on-site; and
- Negative impacts with regard to the environment include potential contamination of the area due to spillage of hydrocarbon products if the mitigation measures proposed in this document is not implemented.

Table 8: Impact Assessment

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING
SITE ESTABLISHMENT PHASE/ CONSTRUCTION PHASE												
ACTIVITY:	SITE VISITS BY VARIOUS SPECIALIST											
Air Quality	Dust Generation	Neg	Reversible	2	1	3	2	5	3	4	8	Low-Med
Air Quality	Emissions	Neg	Reversible	1	1	1	1	5	3	4	4	Low
Archaeological & cultural sites	Loss and disturbance to surface archaeological sites	Neg	Irreversible	1	1	5	2,3	5	1	3	7	Low-Med
Archaeological & cultural sites	Potential disruption to grave sites	Neg	Irreversible	1	1	5	2,3	5	1	3	7	Low-Med
Groundwater	Potential hydrocarbon contamination from leeching into the water table	Neg	Reversible	2	2	2	2	2	2	2	4	Low
Fauna	loss of food, nest sites and refugia	Neg	Reversible	1	2	5	2,7	2	5	3,5	9	Low-Med
Fauna	Potential damage to or destruction of sensitive faunal habitats: Pans & Watering Points	Neg	Reversible	1	2	3	2	2	3	2,5	5	Low-Med
Flora	Loss of biodiversity.	Neg	Reversible	1	2	3	2	2	2	2	4	Low
Noise	Increased noise levels	Neg	Reversible	1	2	1	1,3	1	3	2	3	Low
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination	Neg	Reversible	1	2	1	1	1	1	1	1	Low
Sensitive Landscape	Potential for damage or destruction of sensitive faunal habitats: Pans and watering points	Neg	Reversible	3	3	1	2,3	2	2	2	5	Low-Med
Surface Water	Potential hydro carbonation contamination form leaks or spills which may reach downstream surface water bodies	Neg	Reversible	3	3	1	2,3	2	5	3,5	8	Low-Med
Traffic and Safety	Road degradation. Increased potential for road incidences Potential distraction to road users	Neg	Reversible	1	2	1	1,3	2	5	3,5	5	Low-Med
SITE ESTABLISHMENT PHASE/ CONSTRUCTION PHASE												
ACTIVITY:	Data Collection and Assessment, Geological Mapping, Planning for Drilling Surveys											
	No impact could be identified other than the beacons being outside the boundaries of the approved processing area.	Neg	Reversible									Low
ACTIVITY:	DEMARCATION OF SITE WITH VISIBLE BEACONS.											
	No impact could be identified other than the beacons being outside the boundaries of the approved processing area.	Neg	Reversible									Low
ACTIVITY:	ESTABLISHMENT OF TEMPORARY BUILDINGS AND INFRASTRUCTURE WITHIN BOUNDARIES OF SITE.											
Social & Safety	Influx of unsuccessful job seekers which may informally settle in area. Potential danger to surrounding communities	Neg	Reversible	1	2	5	2,7	2	5	3,5	9	Low-Med
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	4	2,7	2	5	3,5	9	Low-Med
Geology	Disturbance of geological strata	Neg	Irreversible	1	3	5	3	5	5	5	15	Medium-High
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	4	2,7	2	4	3	8	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment	Neg	Reversible	1	4	2	2,3	2	3	2,5	6	Low-Med
Topography	Alteration of topography	Neg	Irreversible	1	2	5	2,7	2	3	2,5	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	2	2	1,7	3	3	3	5	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	3,7	1	3	2	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Increase in ambient noise due to movement of machinery	Neg	Reversible	1	1	3	1,7	2	3	2,5	4	Low

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING
Air quality	Dust nuisance caused by the disturbance of soil. Air pollution through nuisance dust, PM 10 and PM2.5 as well as emissions from machinery.	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals.	Neg	Reversible	2	2	4	2,7	2	5	3,5	9	Low-Med
Surface water	Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment.	Neg	Reversible	3	2	4	3	1	1	1	3	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table Contamination of groundwater from hydrocarbon spillages	Neg	Reversible	2	1	2	1,7	2	3	2,5	4	Low
SUB ACTIVITY: ABLUTION FACILITIES												
Groundwater	Portable Toilets Potential harm through sewage leaks	Neg	Reversible	1	2	3	2	2	5	3,5	7	Low-Med
Surface water	Portable Toilets Potential harm through sewage leaks	Neg	Reversible	1	2	3	2	2	5	3,5	7	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Increase in ambient noise due to movement of machinery	Neg	Reversible	1	1	3	1,7	2	3	2,5	4	Low
Visual aspect	Deterioration in visual aesthetics of the area	Neg	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Soils	Portable Toilets Potential harm through sewage leaks Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	2	5	2,7	2	5	3,5	9	Low-Med
SUB ACTIVITY: ACCESS ROADS												
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	4	2,7	2	5	3,5	9	Low-Med
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	4	2,7	2	4	3	8	Low-Med
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Increase in ambient noise due to movement of machinery	Neg	Reversible	1	1	3	1,7	2	3	2,5	4	Low
Air quality	Dust nuisance caused by the disturbance of soil. Air pollution through nuisance dust, PM 10 and PM2.5 as well as emissions from machinery.	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Surface water	Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment.	Neg	Reversible	3	2	4	3	1	1	1	3	Low
SUB ACTIVITY: PARKING AREA												
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils.	Neg	Reversible	1	3	4	2,7	2	4	3	8	Low-Med

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING
Noise	Noise nuisance caused by machinery stripping and stockpiling the topsoil. Increase in ambient noise due to movement of machinery	Neg	Reversible	1	1	3	1,7	2	3	2,5	4	Low
Air quality	Emissions caused by vehicles and equipment	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
OPERATIONAL PHASE												
ACTIVITY:	DRILLING FOR CONTINUED RESOURCE EVALUATION											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils. The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from the vehicles and machinery. This will result in the contamination of soils. The materials removed from the drilling sites will contain carbonaceous material, which has potential for contamination should it not be managed properly. The material from the drilling site may result in the contamination of soils, which may render the land not usable after backfilling operation.	Neg	Reversible	1	3	4	2,7	2	3	2,5	7	Low-Med
Noise	Noise nuisance generated by drilling equipment= The drilling activities will also result in an increase in noise in the vicinity of the project.	Neg	Reversible	2	1	1	1,3	1	3	2	3	Low
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials	Neg	Reversible	1	3	4	2,7	2	5	3,5	9	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment 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; Failure to initiate a rehabilitation plan and alien control plan during the construction phase may lead to further impacts during the operation phase	Neg	Reversible	1	4	2	2,3	2	3	2,5	6	Low-Med
Topography	Alteration of topography	Neg	Irreversible	1	2	5	2,7	2	3	2,5	7	Low-Med
Geology	Disturbance of geological strata	Neg	Irreversible	1	3	5	3	5	1	3	9	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming	Neg	Reversible	1	2	2	1,7	3	3	3	5	Low-Med
Visual aspect	Deterioration in visual aesthetics of the area The drill rigs and towers used during the drilling operation phase will be visible from nearby locations, and will have visual impact on the local communities in close proximity to the prospecting area.	Neg	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Archaeological & cultural sites	Loss of and disturbance to surface archaeological sites	Neg	Irreversible	1	5	5	3,7	1	3	2	7	Low-Med
Noise	Noise nuisance generated by drilling equipment= The drilling activities will also result in an increase in noise in the vicinity of the project.	Neg	Reversible	1	1	1	1	1	3	2	2	Low
Air quality	Dust generation	Neg	Reversible	1	1	1	1	1	3	2	2	Low
Fauna	Alienation of animals from the area. Potential risk to avifauna. Potential harm through littering. Loss of food, nest sites and refugia Hindrance to nocturnal animals and change in behaviour of nocturnal prey and predators. New habitat available to fauna in the area and reduced activity should result in influx of animals to the area. Impact to nocturnal insects and their predators and other nocturnal animals. The project may result in the following impacts on the faunal environment during the operation phase: Migration of fauna from the prospecting area due to noise as a resulting of drilling activities; Loss of faunal 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 construction phase may lead to further impacts during the operation phase.	Neg	Reversible	2	2	4	2,7	2	5	3,5	9	Low

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING
Surface water	Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of prospecting activities on the runoff and infiltration of storm water. Drilling operations my result in the generation of surface water runoff contaminated with drill muds and cuttings, should spillage occur. The sedimentation and possible contamination with carbonaceous material will have negative impacts on the water quality due to increase turbidity and an increase in acidity of the water in the streams. This will have an impact on aquatic habitats.	Neg	Reversible	2	1	2	1,7	2	3	2,5	4	Low
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table The use of vehicles during the drilling of the exploration boreholes may result in the spillages of hydrocarbons from vehicles and machinery. This will result in the contamination of soils and groundwater. The prospecting operations will require the drilling of boreholes, which my result in the drawdown, which may affect the yield to the surrounding groundwater users. Material used for backfilling boreholes may leach pollutants, which will result in the contamination of surrounding groundwater regime. This may spread beyond the backfilling site via plume migration.	Neg	Reversible	3	3	4	3,3	1	1	1	3	Low
Social & Safety	Health and Safety Risk by Drilling Activities. Potential danger to surrounding communities It is expected that during the operation phase the project will not result in the creation of employment as prospecting requires highly specialized personnel. The applicant will make use of qualified contractors for the drilling and sampling of the sites. The community will however continue to benefit as a result of the continued boost in small local businesses. Drilling has potential to affect the day to day operations by affected landowners	Neg	Reversible	1	3	1	1,7	1	3	2	3	Low
ACTIVITY: GENERAL ACTIVITIES												
SUB ACTIVITY: CREATION OF JOBS												
Social & Safety	Potential for more employment	Pos	Reversible	2	1	2	1,7	2	3	2,5	4	Low
SUB ACTIVITY: ABLUTION FACILITIES												
Groundwater	Portable Toilets Potential harm through sewage leaks	Neg	Reversible	1	2	3	2	2	5	3,5	7	Low-Med
Surface water		Neg	Reversible	1	2	3	2	2	5	3,5	7	Low-Med
Noise		Neg	Reversible	1	1	3	1,7	2	3	2,5	4	Low
Visual aspect		Neg	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Soils		Neg	Reversible	1	2	5	2,7	2	5	3,5	9	Low-Med
SUB ACTIVITY: WASTE GENERATION												
Fauna	Potential harm through littering	Neg	Reversible	1	3	4	2,7	2	5	3,5	9	Low-Med
GROUNDWATER	Potential contamination through littering	Neg	Reversible	1	3	4	2,7	2	4	3	8	Low-Med
soils	Potential contamination through littering	Neg	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Sensitive Landscape	Potential contamination through littering	Neg	Reversible	2	2	4	2,7	2	5	3,5	9	Low-Med
Surface water	Potential contamination through littering	Neg	Reversible	3	2	4	3	1	1	1	3	Low
Groundwater	Potential contamination through littering	Neg	Reversible	2	1	2	1,7	2	3	2,5	4	Low
DECOMMISSIONING PHASE												
ACTIVITY:	SLOPING, LANDSCAPING AND REPLACEMENT OF TOPSOIL OVER DISTURBED AREA (FINAL REHABILITATION)											
Soils	Potential compaction of soils in neighbouring areas. Potential contamination through littering. Potential for loss of soil & damage to soil characteristics. Initial increased potential for loss of soils and soil erosion. Potential hydrocarbon contamination to soils. The removal of the campsite equipment and the rehabilitation of the drilling sites and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Neg	Reversible	1	2	1	1,3	2	3	2,5	3	Low

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING
Soils	Soils replaced and ameliorated	Pos	Reversible	1	3	4	2,7	2	3	2,5	7	Low-Med
Flora	Loss of biodiversity. Potential damage to vegetation in neighbouring areas. Alien invasive encroachment	Neg	Reversible	1	4	2	2,3	2	3	2,5	6	Low-Med
Flora	Area revegetated with indigenous plants	Pos	Reversible	1	2	2	1,7	3	4	3,5	6	Low-Med
Topography	Alteration of topography	Neg	Irreversible	1	2	5	2,7	2	3	2,5	7	Low-Med
Topography	Eradication of trenches and berms. Re-contouring of area for free surface water drainage. Eradication of stockpiles	Pos	Irreversible	1	2	5	2,7	2	3	2,5	7	Low-Med
Land Use	Veldt fire might seriously impact on surrounding land-use (livestock/irrigation of neighbouring farmers). Degrading of grazing potential for livestock farming The removal of the campsite equipment and the rehabilitation of the drilling sites and associated access infrastructure will result in the affected soil and land use being restored. This will also result in the resumption of the use of the land since the infrastructure would have been removed.	Neg	Reversible	1	2	2	1,7	3	3	3	5	Low-Med
Visual aspect	Improved aesthetics through rehabilitation	Pos	Reversible	2	1	3	2	2	3	2,5	5	Low-Med
Noise	Noise nuisance caused by machinery Noise will be generated during the removal of equipment and rehabilitation of the sites. This noise is not expected to exceed occupational noise limits and will be short lived.	Neg	Reversible	2	1	4	2,3	3	3	3	7	Low-Med
Air quality	Dust nuisance caused during landscaping activities Rehabilitation and removal of the prospecting sites and equipment will require vehicular movement. This will result in the generation of dust by movement of vehicles and due to blowing winds. Vehicles and machinery will also generated diesel or petrol fumes. Generated dust will migrate towards the predominant wind direction and may settle on surrounding properties including nearby vegetation.	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Air quality	Emission Monitoring: • The emissions generated by the processing activities must be continuously monitored, and addressed by the implementation of dust suppression methods.	Neg	Reversible	2	2	1	1,7	2	3	2,5	4	Low
Fauna	Reintroduction of fauna attracted to flora to the area	Pos	Reversible	1	2	3	2	1	3	2	4	Low
Social & Safety	Health and safety risk posed by un-sloped areas	Neg	Reversible	2	1	3	2	1	3	2	4	Low
Surface water	Potential silt-loading of drainage lines, downstream and surrounding water bodies. Potential hydrocarbon contamination which may reach downstream surface water bodies. Potential surface water contamination if leaks escape into the environment. Potential impact of prospecting activities on the runoff and infiltration of storm water. During the decommissioning and closure phases equipment will be removed, stockpiled soils will be used for rehabilitation, remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Neg	Reversible	2	1	2	1,7	2	3	2,5	4	Low
Surface water	Containment of dirty water. Improve response to issues relating to deterioration of surface water quality or quantity. Free drainage resorted to area. Revegetation of disturbed areas reduces risk of silt loading on downstream water bodies. Large area of surface water runoff return to catchment	Pos	Reversible	2	1	2	1,7	2	3	2,5	4	Low
Hazardous Waste	Contamination of area with hydrocarbons or hazardous waste materials During the decommissioning and closure phase's equipment will be removed, stockpiled soils will be used for rehabilitation, and remaining sumps will be backfilled, levelled, top soiled and the area re-seeded. During the process of rehabilitation surface water runoff from the rehabilitation site may have elevated silt load, which may cause pollution of the nearby water environment.	Neg	Reversible	1	3	4	2,7	2	5	3,5	9	Low-Med
Groundwater	Potential hydrocarbon contamination leeching into the water table. Reduction of local groundwater. Potential contamination through littering leeching into the groundwater table	Neg	Reversible	2	1	2	1,7	2	3	2,5	4	Low
Groundwater	Improve response to issues relating to deterioration of groundwater quality or quantity	Pos	Reversible	2	1	2	1,7	2	5	3,5	6	Low-Med
ACTIVITY: Application for Closure Certificate												

Cumulative Impacts

Table 9: Cumulative Impact Assessment

NATURE OF IMPACT	IMPACT	POSITIVE/NEGATIVE/ NEUTRAL IMPACT	REVERSIBILITY	EXTENT	SEVERITY	DURATION	CONSEQUENCE	PROBABILITY	FREQUENCY	LIKELIHOOD	SIGNIFICANCE	MITIGATION RATING	MITIGATION
CONSTRUCTION AND OPERATIONAL PHASES													
ACTIVITY: Utilization of haul and access roads within the prospecting right area													
SUB ACTIVITY: Truck and heavy machinery operations													
Traffic & Safety	Increased potential for road incidences	Neg	Reversible	2	3	1	2	3	1	2	4	Low	All intersections with main tarred roads will be clearly signposted. Drivers will be enforced to keep to set speed limits. Trucks will be in road-worthy condition with reflective strips.
Traffic & Safety	Road degradation	Neg	Reversible	1	3	1	1,666667	2	1	1,5	2,5	Low	A fund will be set aside to maintain the serviceability of the road verge where the trucks approach or depart from the main road.