Appendix 17 : Impact assessment

ENVIRONMENTAL IMPACT ASSESSMENT

The methodology that will be used is a synthesis of the product of duration, intensity, extent and probability of identified impacts, as discussed hereunder.

SIGNIFICANCE

Significance is the product of **probability** and **severity**

PROBABILITY

Probability is the likelihood of an impact actually occurring, and which is rated as follows:

Improbable: Low possibility of impact to occur due to design on history

Rating: 2

Possible: Possibility that impact may occur

Rating: 3

Probable: Impact will occur but temporary in nature

Rating: 4

Definite: Impact will occur regardless of prevention measures

Rating: 5

Improbable	Possible	Probable	Definite

SEVERITY RATING

Severity rating is calculated from the factors and values allocated to intensity and duration

The intensity and duration values are awarded to each impact, as described below, namely:

DURATION

Duration is assessed and a value awarded in accordance with the following:

Short term: < 1 to 5 years

Factor: 2

Medium term: 5 to 15 years

Factor: 3

Long term: impact will only cease after the operational live of the activity has ended, either because of natural processes or through human intervention

Factor: 4

Permanent: impact not considered as transient, despite mitigation by either natural process or human intervention

Factor: 5

Short term	Medium term	Long term	Permanent

INTENSITY FACTOR

The intensity factor is awarded to each impact in accordance with the following:

Low intensity:

Nature or man made processes/functions slightly affected

(minor process/human/wildlife damage may occur)

Factor: 1

Medium intensity:

Environment affected but natural/ man made processes/ functions can continue

(some process/human/wildlife damage will occur

Factor: 2

High intensity:

Environment affected to the extent that natural/man made processes/functions are altered on a temporary or permanent basis (major process damage or human/wildlife loss could occur) Factor: 3

Low intensity	Medium intensity	High intensity

SEVERITY RATING

The **severity rating** is obtained from the product of **severity factor X duration factor**

Table 2. Severity rating

Factor	**Rating**
Product values 2 to 4	Low Severity
Product values 5 to 8	Medium Severity (Rating: 3)
Product values 9 to 12	High Severity

Product values 13 to 16		Very High Severity	(Rating: 5)
Factors below 3 = No Significant Impact			
Low severity	Medium severity	High severity	Very high severity

SIGNIFICANCE RATING

A **significance rating** is obtained from the product of **severity rating x probability rating**

The significance rating should influence the proposed development project as follows, namely:

LOW SIGNIFICANCE (Calculated significance rating 4 to 6)

Positive and negative impacts of low significance should have no significant influence on the proposed development.

MEDIUM SIGNIFICANCE (Calculated significance rating 7 to 12)

Positive Impact: Weighs towards a decision to continue

Negative Impact: Impact should be mitigated before the project may proceed

HIGH SIGNIFICANCE (Calculated significance rating 13 to 18)

Positive Impact: Weighs towards a decision to continue. The impact must be enhanced as far as possible during final design

Negative Impact: Impact must be mitigated or reduced to within acceptable levels (low significance rating) before the project may proceed

VERY HIGH SIGNIFICANCE (Calculated significance rating 19 to 25)

Positive Impact: Project/development to continue

Negative Impact: If mitigation cannot be implemented effectively, the project/development must be terminated

Low significance	Medium significance	High significance	Very high significance

1.1 ASSESSMENT OF IMPACTS AND MITIGATORY MEASURES

1.1.1 Geology and Soil

1.1.1.1 Potential impact:

NEGATIVE. The geology of the area might be changed due to the Sand and weathered Sand mining.

Soil might become less fertile and reduce the carrying capacity of the veldt after rehabilitation. Erosion of soil might occur. Due to the mining method that will be used, the rehabilitation of the disturbed area and the relatively small area involved, the impact on the geology and soil will be site specific and very limited.

Table 3a. - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
4	3	2	6	3	12

Significance rating: Medium Significance

Mitigation: Topsoil will be removed before mining activities commence and stored outside active mining cell. The necessary measures will be put in place to limit erosion from the stockpiles and to divert storm water away from the stockpiles. Rehabilitation would be done is such a way to ensure the least impact on the geology and soil characteristics. (For comprehensive mitigation measures see Appendix 18).

1.1.2 Vegetation

1.1.2.1 Potential impact:

NEGATIVE. Vegetation will be removed during mining operations in order to expose the Sand for mining.

Due to the mining method that will be used, the rehabilitation of the disturbed areas and the relatively small area involved, the impact on the vegetation will be site specific and limited to the mining area. Literature indicated that there are various alien weeds and invasive plants in the area, which may occur because of the disturbance of the natural environment.

Table 3b(i) - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
4	3	1	3	2	8

Significance rating: Medium Significance

Mitigation: Topsoil will be removed before mining operations commence. Restoring of topsoil during rehabilitation would encourage natural re-vegetation of

the area. Re-vegetation with indigenous seeds would be done if it is necessary. (For comprehensive mitigation measures see Appendix 18).

1.1.2.2 Potential impact:

NEGATIVE. Invader species encroachment commonly associated with disturbed areas.

Due to the fact that the vegetation would be removed, opportunistic invader species often forms the pioneer vegetation if not controlled properly.

Table 3b(ii) - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
4	3	1	3	2	8

Significance rating: Medium Significance

Mitigation: A weed control plan that would consist of removing the weed by hand on a monthly basis as well as chemical control, where herbicides would be used to combat invader species. (For comprehensive mitigation measures see Appendix 18).

1.1.3 Topography

1.1.3.1 Potential impact:

NEGATIVE. Mining activities may result in depressions in the topography.

Table 3c. - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
2	3	1	3	2	4

Significance rating: Low Significance

Mitigation: Excavated areas will be sloped during rehabilitation to even out depressions. (For comprehensive mitigation measures see Appendix 18).

1.1.4 Land use

1.1.4.1 Potential impact:

NEGATIVE. Degrading of grazing potential for livestock farming.

Table 3d(i) - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
3	3	1	3	2	6

Significance rating: Low Significance

Mitigation: Should it be found after the mining operations have ceased, that the natural re-vegetation of the area is unacceptable, the area would be re-vegetated with an indigenous grass seed mix. (For comprehensive mitigation measures see Appendix 18).

1.1.4.2 Potential impact:

NEGATIVE. Veldt fires might seriously impact on surrounding land-use (livestock/ irrigation of neighbouring farmers).

Table 3d(ii) - Assessment of impacts

Probabi	Durati	Intensit	Sever	Severity	Signific
4	3	2	6	3	12

Significance rating: Medium Significance

Mitigation: Precautionary measures such as fire breaks would be taken and the company will join the local Fire Protection Association. (For comprehensive mitigation measures see Appendix 18).

1.1.5 Visual Aspects

1.1.5.1 Potential impact:

NEGATIVE. Mining operations could visually impact on the environment.

Table 3e - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
4	4	1	4	2	8

Significance rating: Medium Significance

Mitigation: Area would be properly rehabilitated as mining activities progress in order to reduce the visual aspects as much as possible. (For comprehensive mitigation measures see Appendix 18).

1.1.6 Sites of Archaeological and Cultural Interest

1.1.6.1 Potential impact:

NEGATIVE. No known sites of Archaeological and Cultural Interest exist within the proposed mining area.

Table 3f - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
2	3	1	3	2	4

Significance rating: Low Significance

Mitigation: If any sites of Archaeological and Cultural Interest are found during the mining activities, it will be demarcated and mining activities will cease in that demarcated area. The applicable department will be informed of the find. The measures out lined in Appendix 5 will be implemented. (For comprehensive mitigation measures see Appendix 18).

1.1.7 Social Impact

1.1.7.1 Potential impact:

POSIVITE. Financial gain on different levels.

Table 3g - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
4	3	2	6	3	12

Significance rating: Medium Significance

Mitigation: The comprehensive social and labour plan that was submitted as part of the application manages this aspect of the project.

1.1.8 Noise

1.1.8.1 Potential impact:

NEGATIVE. Noise will be generated by heavy earthmoving equipment.

Table 3h - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
4	3	2	6	2	8

Significance rating: Medium Significance

Mitigation: The use of earthmoving equipment will be limited to office hours. Vehicles will be fitted with silencing devices (For comprehensive mitigation measures see Appendix 18).

1.1.9 Dust

1.1.9.1 Potential impact:

NEGATIVE. Dust will be generated heavy earthmoving equipment- Loading and hauling

Table 3i - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
4	3	2	6	2	8

Significance rating: Medium Significance

Mitigation: The sandy nature of the soil will result in little dust. Working times will be strictly controlled. Dust form the haul roads will be controlled with a water cart. (For comprehensive mitigation measures see Appendix 18).

1.1.10 Animal Life

1.1.10.1 Potential impact:

NEGATIVE. Fauna that are currently occurring on the farm might relocate when mining activities commence.

Table 3j - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significanc
4	3	2	6	2	8

Significance rating: Medium Significance

Mitigation: Mining will only take place on designated areas, and will be restricted to office hours. No traps or hunting of any animals will be allowed. Mining will be done with the least possible habitat destruction. Mining activities are only temporary. (For comprehensive mitigation measures see Appendix 18).

1.1.11 Surface water

1.1.11.1 Potential impact:

NEGATIVE. The operation might have a negative impact on surface water runoff.

Table 3k - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
2	3	1	3	2	4

Significance rating: Low Significance

Mitigation: There is no surface water in the vicinity and it will not be used or impacted upon. Proper diversion of runoff water, measures to prevent erosion, good housekeeping and waste management will prevent the contamination of any surface water. (For comprehensive mitigation measures see Appendix 18).

1.1.12 Groundwater

1.1.12.1 Potential impact:

NEGATIVE. Quality and quantity of groundwater could be adversely affected by mining activities.

Table 3l - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity Rating	Significance
2	3	1	3	2	4

Significance rating: Low Significance

Mitigation: Groundwater will only be used for domestic purposes and will not be directly affected by mining activities (For comprehensive mitigation measures see Appendix 18).

1.1.13 Cumulative Impacts

1.1.13.1 Potential impact:

NEGATIVE. Various mining activities in close vicinity of each other could cause various synergistic or antagonistic effects. Specifically to increased traffic on the roads

Table 3m - Assessment of impacts

Probability	Duration	Intensity	Severity	Severity	Significance
3	3	1	3	2	6

Significance rating: Low Significance

Mitigation: There are two similar mining activities within close vicinity of the proposed mine, the cumulative effect of increased traffic and possible damage to the tar road to the Barrage will be managed after consultation with the Provincial Administration of the Free State (Roads Department) in order to find a solution where the 3 mines can co-operate to fix of fund the fixing of potholes on the road. On the mine, rehabilitation would be done concurrently with mining activities and therefore very little cumulative impacts are expected.

1.2 Decommissioning phase

There are no additional impacts predicted during the decommissioning phase because there are no buildings or other infrastructure that needs to be removed other than access roads. No mine residue deposits will remain that need to be removed or rehabilitated.

1.3 Residual impacts after closure

No significant residual impacts are predicted as the closure objective of the operation is to return all disturbed areas back to natural grazing.