APPENDIX: 5

Impact Assessment

IMPACT ASSESSMENT:

IMPACT ASSESSMENT FOR THE S&EIR PROCESS FOR THE PROSPECTING RIGHT FOR THE PROPOSED PROSPECTING FOR DIAMONDS ON THE REMAINDER, PORTION 1 AND PORTION 16 OF THE FARM JAGERSFONTEIN 14, FAURESMITH DISTRICT, FREE STATE PROVINCE

DMR Ref: FS 30/5/1/1/3/2/1 (10505) EM

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1. Assessment methodology

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

Environmental Significance = Overall Consequence x Overall Likelihood.

1.1 Determination of 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 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 below.

Determination of Severity

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 1).

Table 1: 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	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

Type of criteria	Rating				
	1	2	3	4	5
production, fauna and flora)					

Determination of Duration

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 2).

Table 2: Rating of Duration

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Determination of Extent/Spatial Scale

Extent refer to the spatial influence of an impact be local (extending only as far as the activity or will be limited to the site and its immediate surroundings), regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders) (Table 3).

Table 3: Rating of Extent / Spatial Scale

Rating	Description
1: Low	Immediate, fully contained area
2: Low-Medium	Within Prospecting Boundary area
3: Medium	Surrounding area
4: Medium-High	Local (Town boundaries)
5: High	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 4 (Table 4).

Table 4: Example of calculating Overall Consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
TOTAL CONSEQUENCE:(Subtotal divided by 4)	Example 3.3

Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described and in Tables 5 and 6.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken (Table 5).

Table 5: Rating of frequency

Rating	Description
1: Low	Once a year or once / more during operation / LOM
2: Low-Medium	Once / more in 6 Months
3: Medium	Once / more a Month
4: Medium-High	Once / more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment (Table 6).

Table 6: Rating of probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2 (Table 7).

Table 7: Example of calculating the overall likelihood

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

Determination of Overall Environmental Significance

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, MEDIUM-HIGH or HIGH, as shown in the table below (Table 8).

Table 8: Determination of overall environmental significance

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

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact (Table 9).

Table 9: Description of the environmental significance and the related action required.

Significance	Low	Low-Moderate	Moderate	Moderate-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures.	Maintain current management measures.	Implement monitoring. Investigate mitigation	Improve management measures to reduce risk.	Implement significant mitigation measures or

Significance	Low	Low-Moderate	Moderate	Moderate-High	High
	Where possible improve.	Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	measures and improve management measures to reduce risk, where possible.		implement alternatives.

1.2 Environmental Impact Assessment

1. Geology and Soil

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Drilling Phase								
Loss of topsoil through erosion and contamination	2	3	1	2	2	5	3.5	7
MITIGATED	1	1	1	1	1	5	3	3
Trenching/Pitting								
Loss of topsoil through erosion and contamination	3	4	2	3	4	5	4.5	13.5
MITIGATED	2	2	2	2	2	5	3.5	7
Stockpiling								
Loss of topsoil through erosion and contamination	2	4	2	2.7	4	5	4.5	12
MITIGATED	2	1	1	1.3	1	5	3	4
Loading and Hauling								
Loss of topsoil through erosion and contamination	3	3	2	2.7	4	5	4.5	12
MITIGATED	2	2	2	2	2	5	3.5	7

Conclusion

The impact assessment above indicates that significance of the impact of loss of soil will be Low – Moderate without mitigation and Low with the implementation of mitigation and management measures in the drilling phase of the project. During the drilling phase of the project the topsoil will not be removed, and drilling will take place. The amount of soil loss will therefore be very little, and the activity will also be temporary.

However, during trenching, stockpiling and loading and hauling the significance of the impacts will increase as topsoil will have to be cleared and stockpiled. This may lead to larger areas of topsoil losses occurring.

Mitigation:

- It is proposed that topsoil be cleared from all areas where trenching will occur as well as areas planned for the construction of access roads.
- The topsoil must be stockpiled not more than 2 m in height and not on steep slopes which are prone to erosion.
- Topsoil will always be protected and will be kept clean of alien vegetation.
- Topsoil must be returned as the final / top layer of soil after trenches have been backfilled. Topsoil will not be used for any other purpose other than rehabilitation of trenches.

2. Air quality

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Drilling Phase								
Dust (Air Pollution)	3	4	3	3.3	4	5	4.5	15
MITIGATED	3	3	2	2.7	3	5	4	10.7
Noise	3	5	4	4	4	5	4.5	18
MITIGATED	3	3	2	2.7	3	5	4	10.7
Trenching/Pitting								
Dust (Air Pollution)	3	3	3	3	4	5	4.5	13.5
MITIGATED	2	2	2	2	2	5	3.5	7
Noise	2	3	3	2.7	4	5	4.5	12
MITIGATED	2	2	2	2	2	5	3.5	7
Stockpiling								
Dust (Air Pollution)	3	3	3	3	4	5	4.5	13.5
MITIGATED	2	2	2	2	2	5	3.5	7
Noise	2	3	3	2.7	4	5	4.5	12
MITIGATED	2	2	2	2	2	5	3.5	7
Loading and Hauling								
Dust (Air Pollution)	4	4	3	3.7	4	5	4.5	16.5
MITIGATED	2	3	2	2.3	3	5	4	10.7
Noise	3	4	3	3.3	4	5	4.5	15

MITIGATED	3	2	3	2.7	3	5	4	10.7

Conclusion

There are no major industrial complexes or facilities in the Jagersfontein area which contributes to air pollution and noise. Noise in the area is that associated with the tailings operation (i.e. process plant, conveyors, vehicular traffic, etc.) and the town of Jagersfontein (i.e. vehicular traffic, etc.). The surrounding area is used for agriculture mainly in the form of animal grazing. Therefore, the activities associated with the prospecting will add to the ambient noise levels in the area, especially drilling. Trenching, stockpiling and hauling will be noises which are associated with the current tailings operation.

Drilling, loading and hauling will have a Moderate – High impact on air quality and noise before mitigation and a moderate impact after mitigation. This is due to the emissions and noise associated with drilling and the hauling of material on dirt roads. Environmental factors play an important role in the dust emissions in the Jagersfontein area as the area is not located in a high rainfall area.

The impacts on air quality and noise will be Moderate before mitigation and Low – Moderate after mitigation during trenching and stockpiling.

Mitigation

- Conveyors should be used to transport material over long distances to reduce dust.
- A speed limit of 40 km/h should be enforced on vehicles travelling on dirt roads.
- It should be considered to limit activities which causes high dust emissions during very windy conditions.
- The Dust Fallout Monitoring Programme will remain implemented during all phases of the prospecting activities.
- Drilling will only be done during normal daytime hours.

3. Land Use

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Drilling Phase								
Change in land use	2	2	1	1.7	2	5	3.5	5.8
MITIGATED	1	1	1	1	1	5	3	3
Trenching/Pitting								
Change in land use	4	4	1	3	4	5	4.5	13.5
MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Stockpiling								
Change in land use	4	4	1	3	4	5	4.5	13.5
MITIGATED	2	2	1	1.7	2	5	3.5	5.8

Loading and Hauling								
Change in land use	3	3	2	2.7	4	5	4.5	12
MITIGATED	2	2	2	2	2	5	3.5	7

Conclusion

Although the land used for communal grazing during prospecting it must be noted that this impact will be temporary. After trenching the land will be rehabilitated and returned to the determined end land use (i.e. vacant land) which is mainly used for animal grazing.
From the impact assessment it can be derived that the impact on land use during the drilling of boreholes will Low – Moderate before mitigation and Low after mitigation. The impact of trenching, stockpiling and hauling on these areas will be Moderate before mitigation and Low – Moderate after mitigation.
Mitigation

- Small sections of the prospecting areas should be closed off on the communal land when activities occur to still allow the animal grazing on the other areas. The entire area should not be closed during the entire prospecting operation.

- Concurrent rehabilitation is important and should be implemented. Trenches should be completely rehabilitated after work is completed on it and should not be left open until the end of the prospecting operations.

4. Vegetation, Animal Life and loss of watercourses

As per the Ecological and Wetland Assessment by Mr. D. Van Rensburg. The report is attached in Appendix 5.

Significance of the impact:

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Before mitigation								
Loss of vegetation type and clearing of vegetation	3	4	3	3.3	3	4	3.5	11.5
Loss of protected species	4	5	3	4	4	3	3.5	14
Loss of watercourses	4	5	4	4.3	4	3	3.5	15
Infestation with weeds and invaders	4	4	3	3.6	4	3	3.5	12.6
Impact on Terrestrial fauna	3	4	3	3.3	3	3	3	10
After mitigation								
Loss of vegetation type and clearing of vegetation	3	3	3	3	3	3	3	9
Loss of protected species	1	5	3	3	1	1	1	3
Loss of watercourses	3	3	3	3	4	3	3.5	10.5
Infestation with weeds and invaders	2	2	3	2.3	3	2	2.5	5.7
Impact on Terrestrial fauna	3	4	3	3.3	3	3	3	10

5. **Groundwater**

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Drilling Phase								
Groundwater contamination	3	3	2	2.7	4	5	4.5	12
MITIGATED	2	2	2	2	2	5	3.5	7
Trenching/Pitting								
Groundwater contamination	4	4	1	3	4	5	4.5	13.5

MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Stockpiling								
Groundwater contamination	4	4	1	3	4	5	4.5	13.5
MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Loading and Hauling								
Groundwater contamination	3	3	2	2.7	3	5	4	10.7
MITIGATED	2	2	2	2	2	5	3.5	7

Conclusion

It should be noted that the prospecting operation will not have an additional impact on the water quantity in the area as no additional water will be abstracted from any sources to make provision for the prospecting operation. The existing Water Use License which the Applicant has will be used during the operation.

However, there may be an impact on water quality due to the spillage of hydrocarbons during the prospecting activities. These will be limited and the risk of large volumes of spills is unlikely as petrochemical substances will not be stored in large volumes at the prospecting sites.

It was determined that the significance of the impacts before mitigation will be Moderate and after mitigation it will be Low – Moderate.

Mitigation

- No hazardous substances will be stored at the prospecting sites permanently in large volumes.
- Drip trays will be placed under all equipment and vehicles which may cause spills.
- Servicing of vehicles will be carried out at the existing workshop and not at the prospecting areas.

6. Archaeological, Paleontological and Cultural Resources

Refer to the Impact Assessment undertaken by the Heritage Specialist in the HIA in Appendix 5