

ENVIRONMENTAL IMPACT STATEMENT – PETRA QUARRY (PTY) LTD
FS 30/5/1/2/2/10059 MR & FS 30/5/1/2/2/10069 MR

1. ENVIRONMENTAL IMPACT STATEMENT

This Environmental Impact Statement provides a summary of the actual and potential impacts of the mining activities on the environment, considering the implementation of management and mitigation measures. It specifically addresses the nature, duration, likelihood, and significance of these impacts.

Blasting

Health and safety risk posed by blasting activities

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	2	3	2.5	7.5

Dust nuisance caused by blasting activities

Rating: Medium – High

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	4	4	5	3	4	16

Noise nuisance caused by blasting activities

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	2	3.3	5	3	4	13.2

Excavations

Visual intrusion associated with the excavation activities

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	4	5	4.5	11.7

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Dust nuisance due to excavation activities

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	4	5	4.5	11.7

Noise nuisance generated by excavation equipment

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	4	5	4.5	11.7

Contamination of surface or groundwater due to effluent runoff from excavation area

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	2	3.3	2	1	1.5	5

Unsafe working conditions for employees

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	3	3	3	9

Negative impact on the fauna and flora of the area

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	3	5	4	10.4

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Potential damage to cultural or heritage aspects

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	1	1	1	3

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	4	3	3.5	10.5

Crushing

Dust nuisance due to the crushing activities

Rating: Medium - High

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	4	4	4	4	4	16

Noise nuisance generated by the crushing activities

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	4	4	4	4	4	16

Contamination of area with hydrocarbons or hazardous waste materials

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	4	3	3.5	10.5

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Stockpiling and Transporting

Visual intrusion associated with stockpiled material and vehicles transporting the material

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	4	4	4	10.4

Weed and invader plant infestation of the area due to the disturbance of the soil

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	4	2	3	7.8

Dust nuisance from stockpiled material and vehicles transporting the material

Rating: Medium - High

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	4	4	4	4	4	16

Degradation of access roads

Rating: Low - Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	3	2	2.5	6.5

Noise nuisance caused by vehicles

Rating: Low - Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	1	2.6	2	4	3	7.8

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Contamination of area with hydrocarbons or hazardous waste materials

Rating: Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	4	3	3.5	10.5

Sloping and Landscaping during rehabilitation of the site

Soil erosion

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	1	1	1.3	3	1	2	2.6

Health and safety risk posed by un-sloped areas

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
4	5	1	3.3	4	1	2.5	8.3

Dust nuisance caused during sloping and landscaping activities

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	2	4	3	4	1	2.5	7.5

Noise nuisance caused by machinery

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	1	3	2	3	1	2	4

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Contamination of area with hydrocarbons or hazardous waste materials

Rating: Low

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	1	1	1.6	3	1	2	3.2

Replacing the Topsoil and Re-Vegetation of the disturbed area

Loss of reinstated topsoil due to the absence of vegetation

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	5	1	3	4	1	2.5	7.5

Infestation of the area by weed and invader plants

Rating: Low - Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
3	4	1	2.6	4	2	3	7.8

Leisure Residential Infrastructure

Nuisance due to liberation of dust from the mining area

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	2	3	3	3	3	9

Noise nuisance caused by blasting activities

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
1	5	2	2.6	3	2	2.5	6.5

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Roads

The use of the road by heavy machinery and vehicles may cause deterioration

Rating: Low – Medium

			Consequence			Likelihood	Significance
Severity	Duration	Extend		Probability	Frequency		
2	5	2	3	3	2	2.5	7.5

Socio -economic impacts

Work opportunities to forty seven workers (Positive Impact)

Rating: High Positive Impact

Skills development plan for workers (Positive Impact)

Rating: High Positive Impact

Local economic development plan (Positive Impact)

Rating: High Positive Impact

2. ENVIRONMENT IMPACT ASSESSMENT METHODOLOGY

The following methodology was used in the 2015 impact assessment:

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.
- ⊕ 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).

Impact

The positive or negative effects on human well-being and / or the environment.

Consequence

The intermediate or outcome of an event or situation OR it is the result, on the environment, of an event.

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Likelihood

A qualitative term covering both probability and frequency.

Frequency

The number of occurrences of a defined event in each time or rate.

Probability

The likelihood of a specific outcome measured by the ratio of a specific outcome to the total number of possible outcomes.

Environment

Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation (ISO 14004, 1996).

Methodology that will be used

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

$$\text{Environmental Significance} = \text{Overall Consequence} \times \text{Overall Likelihood}$$

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 below.

Determination of Severity / Intensity

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. The table below will be used to obtain an overall rating for severity, taking into consideration the various criteria.

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Table 1: Table to be used to obtain an overall rating of severity, taking into consideration the various criteria.

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

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: Criteria for the rating of duration.

Rating	Description
1	Up to ONE MONTH
2	ONE MONTH to THREE MONTHS (QUARTER)
3	THREE MONTHS to ONE YEAR
4	ONE to TEN YEARS
5	Beyond TEN YEARS

Determination of Extent/Spatial Scale

Extent or spatial scale is the area affected by the event, aspect, or impact.

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Table 3: Criteria for the rating of extent / spatial scale.

Rating	Description
1	Immediate, fully contained area
2	Surrounding area
3	Within Business Unit area of responsibility
4	Within the farm/neighbouring farm area
5	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarized below and then dividing the sum by 3.

Table 4: Example of calculating overall consequence.

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	10
TOTAL CONSEQUENCE: (Subtotal divided by 3)	3.3

Determination of Likelihood:

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.

Determination of Frequency

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

Table 5: Criteria for the 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

Determination of Probability

Probability refers to how often the activity or aspect has an impact on the environment.

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Table 6: Criteria for the rating of probability.

Rating	Description
1	Almost never / almost impossible
2	Very seldom / highly unlikely
3	Infrequent / unlikely / seldom
4	Often / regularly / likely / possible
5	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: Example of calculating overall likelihood.

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	6
TOTAL LIKELIHOOD (Subtotal divided by 2)	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-HIGH** or **HIGH**, as shown in the table below.

Table 8: Determination of overall environmental significance.

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

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.

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

Significance	Low	Low-Medium	Medium	Medium-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 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. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

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.

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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 or 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.

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