

Appendix 5



Environmental
Management
Group (Pty) Ltd.

**IMPACT ASSESSMENT
FOR THE:**

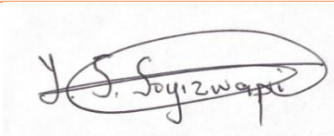
APPLICATION FOR A MINING
PERMIT ON FARM
DORPGRONDEN VAN
KROONSTADT 460, PORTION
0, KROONSTAD MAGISTRIAL
DISTRICT,

Moqhaka Local Municipality
Free State Province

Prepared for:

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Contents

| | |
|---|----|
| List of tables: | 3 |
| List of equations: | 4 |
| 1. Introduction: | 4 |
| 2. Methodology: | 4 |
| 2.1. Determination of consequence:..... | 5 |
| 2.2. Determination of overall environmental significance: | 8 |
| 3. Impact assessment:..... | 10 |
| 3.1. Ecological impacts: | 10 |
| 3.2. Heritage or archaeological impacts: | 13 |
| 3.3. Water resource impacts: | 14 |
| 3.4. Aesthetics impacts: | 15 |
| 3.5. Air quality and noise impacts:..... | 17 |
| 3.6. Waste impacts:..... | 20 |
| 4. Risk assessment and conclusion:..... | 21 |

List of tables:

Table 1: Rating criteria describing the intensity of a given aspect..... 6

Table 2: Rating criteria for determination of duration 7

Table 3: Rating criteria for the determination of extent/spatial scale 7

Table 4: Rating Criteria for the determination of likelihood..... 8

Table 5: Environmental significance evaluation score sheet. 8

Table 6: Rating criteria for impact significance. 9

Table 7: The anticipated ecological impacts associated with habitat loss of the proposed mining area on the receiving environment..... 10

Table 8: The anticipated ecological impacts associated with the loss of indigenous flora and fauna of the proposed mining area on the receiving environment. 11

Table 9: The anticipated ecological impacts associated with soil erosion and soil instability of the proposed mining area on the receiving environment. 12

Table 10: Anticipated archaeological impacts of the proposed mining area on subsurface heritage resources and surface artefacts of the receiving environment. 13

Table 11: The anticipated environmental impacts associated with surface water drainage of the proposed mining area on the receiving environment. 14

Table 12: Anticipated visual impacts associated with the visual appearance of proposed mining area on the receiving environment..... 16

Table 13: Anticipated environmental impacts associated with air quality of the proposed mining area on the receiving environment..... 17

Table 14: Anticipated environmental impacts associated with noise and vibrations of the proposed mining area on the receiving environment..... 18

Table 15: Anticipated environmental impacts associated with general solid waste of the proposed mining area on the receiving environment..... 20

List of Equations:

Equation 1: Calculation of environmental significance. 5

Equation 2: Calculation of overall consequence. 7



1. Introduction:

The environmental and social impact assessments for the proposed mining area are presented as part of the risk assessment methodology and associated results. This process aims to identify potential impacts associated with the proposed mining activity and evaluate their significance to ensure appropriate mitigation measures are applied. Recommendations for suitable mitigation measures to reduce the potential consequences of likely impacts associated with the project have been formulated based on industry best practices, professional experience, and relevant legislation.

This report describes the environmental impacts and risks identified during the environmental impact assessment conducted for the proposed mining area. The Environmental Impact Assessment (EIA) is a structured approach for gathering and evaluating environmental information before making decisions in the development process. This information primarily includes predictions of how the environment may change if certain alternative actions are implemented, and it provides guidance on the best ways to manage environmental changes if a particular alternative is selected and implemented.

It's important to note that the proposed mining activity typically does not include a construction phase; therefore, no construction phase impacts can be assessed. Instead, this impact assessment focuses on the actual operational and decommissioning impacts (mining and post-mining phase) that will occur.

2. Methodology:

Management and risk assessment plays a key role in the proponent's business. Managing the risks must be integrated into day-to-day business-related processes to ensure that both operational and strategic decisions are risk-based. The risk management system provides a framework to identify both threats and opportunities. The system then compensates and initiates resources that are allocated to treat the risks. It is required to review the risks as an ongoing process and then proceed to review the efficacy of the controls.

The risk assessment comprises quantifying the magnitude of potential impacts and the likelihood of these impacts to occur. The Consequence (**C**) and Likelihood (**L**) matrix combine the qualitative and or semi-quantitative ratings of consequence and the likelihood that a specific impact consequence will occur to calculate a risk score and risk rating (Equation 1). Essentially, the greater a probability of an adverse impact occurring, the greater the risk level associated with it will be.

C = Overall consequence
L = likelihood of occurrence



Equation 1: Calculation of environmental significance.

$$\text{Environmental Significance} = C \times L$$

2.1. Determination of consequence:

Consequence analysis is a combination 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 between 1 to 5, as described in the tables below.

2.1.1. Determination of severity:

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe or intense a given aspect's impact on the biophysical and socio-economic environment will be.

Table 1: Rating criteria describing the intensity of a given aspect.

| 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 | Medium change / deterioration or disturbance | Significant change / deterioration or disturbance | Very significant change / deterioration or disturbance | Disastrous change / deterioration or disturbance |

2.1.2. Determination of duration:

Duration refers to the amount of time the receiving environment will be exposed to a given aspect, risk or impact, given the absence or enforcement of intervention/mitigation measures.

Table 2: Rating criteria for determination of duration

| Rating | Description |
|----------------|--------------------|
| 1: Low | 1 Month |
| 2: Low-Medium | 1 – 3 Months |
| 3: Medium | More than 3 Months |
| 4: Medium-High | 5 – 10 Years |
| 5: High | More than 10 Years |

2.1.3. Determination of extent/spatial scale:

Extent refers to the spatial influence of an impact, be it contained to the immediate area (will have an impact on a site-specific scale i.e. within the mining area), extending to the surrounding area (will have an impact on a localised scale i.e. within the nearest/associated town/city), regional (will have an impact on a regional scale i.e. within the site's associated province), national (will have an impact on a national scale i.e. within multiple provinces or within South Africa) or international (will have an impact on an international scale i.e. across South Africa and its bordering countries or globally).

Table 3: Rating criteria for the determination of extent/spatial scale

| Rating | Description |
|----------------|--|
| 1: Low | Immediate, fully contained area (site) |
| 2: Low-Medium | Surrounding area |
| 3: Medium | Regional |
| 4: Medium-High | National |
| 5: High | International |

2.1.4. Determination of overall consequence:

The overall consequence is determined by calculating the sum of all impact factors described above and those summarised below, divided by the total number of impact factors (three) (Equation 2).

I = Intensity
D = Duration
E = Extent
n = number of factors

Equation 2: Calculation of overall consequence.

$$\text{Overall Consequence} = \frac{\sum(I+D+E)}{n}$$

2.1.5. Determination of likelihood:

Likelihood refers to the probability of a given aspect/impact to occur given that no mitigation measures are implemented.

Table 4: Rating Criteria for the determination of likelihood.

| Rating | Description |
|----------------|--------------------------------|
| 1: Low | < 30% chance of occurrence |
| 2: Low-Medium | 30% - 50% chance of occurrence |
| 3: Medium | 50% - 70% chance of occurrence |
| 4: Medium-High | 70 – 90% chance of occurrence |
| 5: High | >90% of occurrence |

2.2. Determination of overall environmental significance:

2.2.1. Quantitative analysis of the overall environmental significance:

The overall environmental significance is determined by multiplying the overall consequence (**C**) by the likelihood of occurrence (**L**) (Equation 1). The rationale of the overall environmental significance relates to identifying and quantifying the sum of environmental impacts arising from the proposed development and the recommendation of appropriate mitigation measures.

Table 5: Environmental significance evaluation score sheet.

| Aspect | Specific | Low | Low-Medium | Medium | Medium-High | High |
|------------------------------------|---|-----|------------|--------|-------------|-------|
| Overall Environmental significance | Consequence x Overall Likelihood (Equation 1) | 1-5 | 6-10 | 11-15 | 16-20 | 21-25 |

2.2.2. Qualitative description or magnitude of the environmental significance:

The qualitative description of environmental significance attempts to provide an indication of the nature and or magnitude associated with the proposed development. It also guides the prioritisation and decision-making process related to this event, aspect or impact.

Table 6: Rating criteria for impact significance.

| 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 the company | Impact is real and substantial in relation to other impacts. Pose a risk to the company and environment. 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. |

3. Impact assessment:

3.1. Ecological impacts:

The ecological impact assessment takes into consideration the site’s natural condition and any sensitivities, in terms of habitat diversity, species diversity and ecological diversity. Additionally, the ecological impact assessment focuses on the biological diversity in respect to flora, fauna and their biological interactions with the abiotic environment. Despite the outcomes for the significance ratings for each ecological impact aspect, the responsibility of ensuring that those impacts do not exceed the boundary of the authorised area falls to the applicant or designated authority. Aspects which may cause damage outside the authorised development area include but are not limited to noise pollution, water pollution, air pollution etc. The applicant is to take steps which greatly limit the potential of such adverse impacts to occur.

The decommissioning phase of the proposed mining area is not anticipated to generate any impacts which may lead to ecological impacts greater than what was already caused during the operational phase. It is the applicant’s responsibility to ensure that mitigation measures are implemented to reduce the potential of such adverse impacts to occur.

Table 7: The anticipated ecological impacts associated with habitat loss of the proposed mining area on the receiving environment.

| 3.1.1. Habitat loss | | | | | | | |
|--|---|----------|----------|--|--------------|------------|--------------|
| Impact | Removal of endangered or protected plant species | | | | | | |
| Activities (not an all-inclusive list) | <ul style="list-style-type: none"> Physical clearance Erosion Habitat fragmentation | | | <ul style="list-style-type: none"> Poor rehabilitation techniques Excavation and trampling and off-roads | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 3 | 3 | 9 |
| Mitigation | <ul style="list-style-type: none"> Restrict the mining area to the authorized footprint. No off-roading or reckless driving is allowed on site. Establish a thorough fire prevention program. Implement toolbox talks with staff that focus on environmental awareness. Implement erosion control measures. No disturbance-related activity may occur within 30 m of any surface water resource. Adhere to the recommendations and mitigation listed in the EMPr and specialist assessments. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 2 | 4 |
| Decommissioning phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 3 | 1 | 2 | 3 | 6 |
| Mitigation | <ul style="list-style-type: none"> Remove all site infrastructure from the mining area. Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species. | | | | | | |

| | | | | | | | |
|-------------------|--|----------|----------|--------|--------------|------------|--------------|
| | <ul style="list-style-type: none"> If rehabilitation is occurring to slow, then hydroseeding should be implemented during the rainy season. The post mining soils should be stabilised to prevent erosion. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 2 | 1 | 1 | 2 | 2 |
| Additional Notes: | | | | | | | |
| N/A | | | | | | | |

During the operational phase environmental impacts on habitat loss will be **Low-Medium** for if no mitigation occurs. On the other hand, if mitigation of the environmental impacts during the operational phase are implemented, the impacts will be **Low**.

Table 8: The anticipated ecological impacts associated with the loss of indigenous flora and fauna of the proposed mining area on the receiving environment.

| 3.1.2 Loss of indigenous flora and fauna | | | | | | | |
|---|---|----------|----------|---|--------------|------------|--------------|
| Impact | Loss of indigenous floral and faunal elements. | | | | | | |
| Activities (not an all-inclusive list) | <ul style="list-style-type: none"> Physical clearance Erosion Habitat fragmentation Illegal poaching and gathering of plants and animals | | | <ul style="list-style-type: none"> Poor rehabilitation techniques Excavations Trampling and off roading Pollution and littering | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 3 | 3 | 9 |
| Mitigation | <ul style="list-style-type: none"> No illegal poaching/collecting of animals and plant material may be allowed. Conduct toolbox talks which focusses on environmental awareness. No pollution is allowed. All debris/ littered items should be removed from site to a registered landfill site. Erosion control should be implemented. Strict compliance to the EMPr and specialist recommendations. Restrict mining to the authorised footprint. Strict compliance to the environmental authorisation's conditions. No mining operations should commence until necessary flora permits have been obtained. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 2 | 4 |
| Decommissioning phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 3 | 1 | 2 | 2 | 4 |
| Mitigation | <ul style="list-style-type: none"> Remove all site infrastructure from the mining area. Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species. If rehabilitation is occurring to slow, then hydroseeding should be implemented during the rainy season. The post mining soils should be stabilised to prevent erosion | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 2 | 1 | 1 | 1 | 1 |

Additional Notes:

Vegetation found on site showed signs of minor ecological disturbances such as trampling, illegal dumping and introduction of alien and invasive species. Previous mining activities was observed to have resulted in landscape transformation. Together these impacts lead to weakened site functionality and overall semi-natural to fair site ecological functioning. The proposed mining area is located within a 3 km radius of Kroonstad, in a largely built-up, agricultural or previously mined environment. Roughly half of the proposed mining area has been directly affected and entirely transformed by previous mining activities. The remaining vegetation is in a semi-natural to near-natural ecological condition.

The ecological condition of remaining vegetation is influenced by indirect impacts from previous mining activities, such as landscape transformation, topsoil disturbance, the introduction of alien species which repopulate barren spaces quicker than indigenous species, loss of natural species richness, illegal dumping of rubble and domestic waste and litter. Despite the observation of one protected species within the study area, no floral SCC were observed. In the vegetation's current state, the occurrence of floral SCC is low.

The environmental impact assessment in terms of habitat and floral components is expected to be low with or without mitigation measures. Thus, the commencement of use of the proposed mining area is not expected to influence the environment drastically negatively at the site. However, these influences will be permanent, and care must be taken to minimise the long-term effect of the proposed mining area on the environment.

Operational phase environmental impacts on the loss of indigenous flora and fauna will be **Low** for if mitigation occurs or not.

Table 9: The anticipated ecological impacts associated with soil erosion and soil instability of the proposed mining area on the receiving environment.

| 3.1.3. Soil erosion and soil instability | | | | | | | |
|--|--|----------|----------|--------|--------------|------------|--------------|
| Impact | Soil erosion caused by soil instability associated with vegetation clearance and mining activities. | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 3 | 3 | 9 |
| Mitigation | <ul style="list-style-type: none"> Vegetation should be retained for as long as is possible. Areas to be excavated which require vegetation clearance should be kept to a minimum. When soil is being stripped, the topsoil with remaining grasses should be stored separately from sub-soil for use in rehabilitation. This is to ensure that the soil's natural seed bank remains intact, which is crucially important for the site's recovery. Mulch, topsoil, subsoil and overburden must be kept separate in stockpiles no higher than 2-3 m. These stockpiles must not be further disturbed by vehicle movement. Stockpiles should not be contaminated with oil, other fuels, litter, waste or other pollutants or contaminants. All other soil conservation techniques should be applied. Limit footprint to the authorized area. Dust control measures. Remedy through soil erosion and soil instability mitigation measures. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 2 | 4 |
| Decommissioning Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 2 | 2 | 2 | 3 | 6 |
| Mitigation | <ul style="list-style-type: none"> Overburden, subsoil and topsoil must be backfilled in levelled layers. Soil erosion mats must be placed in areas with steep slopes. | | | | | | |

| | | | | | | | |
|-------------------|--|----------|----------|--------|--------------|------------|--------------|
| | <ul style="list-style-type: none"> Mulch and saved propagules must be placed with the topsoil. All other soil conservation techniques and recommendations should be applied. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 1 | 1 | 1 | 2 | 2 |
| | | | | | | | |
| Additional Notes: | None | | | | | | |

Operational phase ecological impacts associated with soil erosion and soil instability will be **Low-Medium** if mitigation does not occur. However, if mitigation occurs, the ecological impacts associated with soil erosion and soil instability will be **Low**. Decommissioning phase ecological impacts associated with soil erosion and soil instability will be **Low-Medium** if mitigation measures are not implemented. However, if mitigation measures are implemented, the ecological impacts associated with soil erosion and instability will be **Low**.

3.2. Heritage or archaeological impacts:

The heritage theme involves culturally significant finds including, but not limited to fossils, artefacts and certain culturally relevant infrastructure.

Table 10: Anticipated archaeological impacts of the proposed mining area on subsurface heritage resources and surface artefacts of the receiving environment.

| 3.2.1. Artefacts and Fossils | | | | | | | |
|--|--|----------|----------|--------|--------------|------------|--------------|
| Impact | Destruction of any archaeological artefacts or fossils | | | | | | |
| Activities (not an all-inclusive list) | <ul style="list-style-type: none"> Accidental destruction of below ground fossils due to excavations. Illegal poaching of heritage resources. Accidental destruction of surface scattered heritage resources. | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 1 | 2 | 1 | 2 |
| Mitigation | <ul style="list-style-type: none"> SAHRA and a qualified archaeologist be consulted immediately in the event of accidental archaeological exposure. In the unlikely event of accidental archaeological exposure, all excavations should stop immediately. No loose chance finds such as stone age artefacts (arrow heads, stone flake blades etc.) may be collected. The on-site environmental representative should consult the appointed ECO regarding any such discoveries. All construction debris/ waste should be removed from site and may not be deposited in on-site excavated waste pits. Strict compliance to the conditions/recommendations and mitigations listed in the specialist report and EMP. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 1 | 2 |
| | | | | | | | |
| Additional Notes: | According to the findings of the Heritage Specialist, the proposed mining activity covers part of an old borrow pit that has also been used as a dumping site. Old excavations indicate | | | | | | |

alternating sandstone, siltstone and mudstone beds with the latter showing varying degrees of induration resulting from the contact metamorphic effect of a local dolerite intrusion. Anticipated impact will have negligible negative effects if excavation is restricted to any remnant dolerite sheets but could have moderate negative effects on the remaining fossil-bearing, Adelaide Subgroup sedimentary strata and will require monitoring by a professional palaeontologist at appropriate times if large-scale excavations exceed 1 m into intact sedimentary rocks (Chance Find Protocol attached).

As far as archaeological heritage is concerned; anticipated impact at proposed mining area will have negligible negative effects and will require no mitigation. The proposed development may proceed provided that all construction activities are restricted to within the boundaries of the demarcated site.

Operational phase archaeological impacts of the proposed mining area on the subsurface heritage resources and surface artefacts will be of **Low** significance with or without mitigation. It's not anticipated that destruction to any artefacts or heritage resources will take place during the decommissioning phase.

3.3. Water resource impacts:

The water resource theme encompasses an assessment of freshwater systems, encompassing both surface and groundwater resources. Surface water drainage is an essential facet of this evaluation, as it plays a pivotal role in managing the flow and distribution of surface water within the region.

Table 11: The anticipated environmental impacts associated with surface water drainage of the proposed mining area on the receiving environment.

| 1. Surface and Ground Water Quality | | | | | | | |
|--|--|----------|----------|--------|--------------|------------|--------------|
| Impact | Sewage and chemical effluent have the potential to adversely affect the quality of any receiving water body unless properly managed. | | | | | | |
| Activities (not an all-inclusive list) | <ul style="list-style-type: none"> Oil spills/ leaks in close proximity to water resources. Surface water and ground water pollution Disrupting surface flow/ drainage path patterns Altering the surface topography Soil erosion and increased runoff causing increased turbidity and potentially eutrophication | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 2 | 3 | 6 |
| Mitigation | <ul style="list-style-type: none"> Drip trays under stationary vehicles. Mining may not take place within 32 m from any surface water resource. Mining should be restricted to the authorised footprint. Erosion control measures should be implemented. All chemical / oil spills should be cleaned up immediately and disposed off at a facility authorised to receive chemical/ oil products. No burial of debris / waste. Disturbance related activities must stay at least 32 m from the nearest water resource. Spill kits should be present on site. Environmentally focused toolbox talks should be held. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 2 | 4 |

| Decommissioning phase | | | | | | | |
|-----------------------|--|----------|----------|--------|--------------|------------|--------------|
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 3 | 1 | 2 | 2 | 4 |
| Mitigation | <ul style="list-style-type: none"> Remove all site infrastructure from the mining area. Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species. The post mining soils should be stabilised to prevent erosion. No hazardous waste or general waste / debris may be buried. All waste or items containing waste should be appropriately disposed off. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 2 | 1 | 1 | 1 | 1 |
| Additional Notes: | N/A | | | | | | |

Operational phase environmental impacts associated with surface water drainage will be **Low-Medium** if mitigation does not occur. However, if mitigation occurs, the environmental impacts associated with surface water drainage will be **Low**. Decommissioning phase environmental impacts associated with surface water drainage will be **Low** if mitigation does not occur. However, if mitigation occurs, the environmental impacts associated with surface water drainage will still be **Low**.

3.4. Aesthetics impacts:

The aesthetic theme is focused on the alteration of the visual characteristics of the area and overall impact on landscape appreciation. Landscape appreciation is inherently subjective with few metrics allowing for an objective impact assessment.

Table 12: Anticipated visual impacts associated with the visual appearance of proposed mining area on the receiving environment.

| 3.4.1 Visual appearance of borrow pit excavation | | | | | | |
|--|--|----------|--------|--------------|------------|--------------|
| Impact | Negative overall aesthetic value due to mining activities | | | | | |
| Activities (not an all inclusive list) | <ul style="list-style-type: none"> • Mining operations • Transport vehicles moving in and out of site • Overburden • Erosion and vegetation trampling | | | | | |
| Operational Phase | | | | | | |
| Before Mitigation | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | 4 | 4 | 2 | 3 | 4 | 12 |
| Mitigation | <ul style="list-style-type: none"> • Topsoil, overburden and mulch piles should be arranged around the edge of the excavation and kept separate from one another. • The topsoil and mulch piles should be no less than 2 m and no more than 3 m in height, as this will be the most uniform (thus visually appealing) and practical. • Topsoil and mulch stockpiles as well as open mining areas should be kept clear of alien and invasive species. • Finish mining operations as soon as possible. • Organise transport trips to minimise the amount of trips required. • Remedy all erosion problems as soon as possible. • Mining operations should remain within the authorised area. | | | | | |
| After Mitigation | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | 2 | 3 | 1 | 2 | 2 | 4 |
| Decommissioning Phase | | | | | | |
| Before Mitigation | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | 2 | 3 | 1 | 2 | 3 | 6 |
| Mitigation | <ul style="list-style-type: none"> • During decommissioning of the mining area, the overburden, topsoil and mulch stockpiles should be re-deposited into the excavation area in levelled layers with natural contours for each type of deposition. • Erosion control measures must also be considered and carried out during the backfilling of the topsoil and mulch deposition. • Backfilling of topsoil and mulch should be spread evenly throughout the excavated area to achieve natural contouring. • The sides of the excavated area must have slopes which blend with the surrounding area. • This can be achieved with the excavation sides being given flowing curves. • The site rehabilitation plan should be followed to improve overall visual aesthetics. | | | | | |
| After Mitigation | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | 1 | 2 | 1 | 1 | 1 | 1 |
| Additional Notes: | N/A | | | | | |

Operational phase visual impacts associated with the visual appearance of the proposed mining area will be of **Medium** if mitigation does not occur. However, if mitigation occurs, the visual impacts associated with visual appearance will be **Low**. During the decommissioning phase, visual impacts associated with the visual appearance of the proposed mining area will be of **Low-Medium** significance if mitigation does not occur. However, if mitigation occurs during the decommissioning phase, the visual impacts associated with the visual appearance of proposed mining area will be **Low**.

3.5. Air quality and noise impacts:

Noise and air quality assessments are based upon the type of equipment being used during a specific activity and the degree of disturbance that will occur. Air quality is further impacted by emissions emanating from the operational activities generated by the proposed mining area

Table 13: Anticipated environmental impacts associated with air quality of the proposed mining area on the receiving environment.

| 3.5.1. Air quality | | | | | | | |
|--|---|----------|----------|--------|--------------|------------|--------------|
| Impact | Mobilization of equipment, land clearing and earthworks which increase dust and fume emissions. | | | | | | |
| Activities (not an all inclusive list) | <ul style="list-style-type: none"> Dust created by excavations Dust created by hauling trucks Removal of vegetation | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 3 | 2 | 6 |
| Mitigation | <ul style="list-style-type: none"> Retain vegetation cover for as long as possible to maintain soil stability. Excavated topsoil should be kept in 2-3 m high windrows along the boundary edge of the proposed mining area to avoid wind erosion. Stockpiles should not be placed along the edge or walls of the excavation area as this poses a health and safety risk to employees. Water or other dust suppression agents should be sprayed on areas with loose soil/ground to reduce dust emissions. Unnecessary excessive vehicle movement should be avoided. Speed of vehicles on unsurfaced roads should be reduced and vehicles should be given a corresponding speed limit. Equipment and vehicles must be maintained and kept in good working order to reduce excessive emissions. Fires are prohibited on site. All other dust control measures should be implemented. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 2 | 4 |
| Decommissioning Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 3 | 3 | 1 | 2 | 2 | 4 |
| Mitigation | During back filling the soil must be levelled, which is best done in layers. Once levelled, the top layer of back filled soil should be sprayed with water or other dust suppression agents to reduce dust emissions when the following layer of soil is backfilled into the excavated area. | | | | | | |



| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
|-------------------|----------|----------|----------|--------|--------------|------------|--------------|
| | Negative | 1 | 2 | 1 | 1 | 1 | 1 |
| Additional Notes: | N/A | | | | | | |

Operational phase environmental impacts associated with air quality will be of **Low-Medium** significance for if mitigation does not occur. However, its mitigation occurs during the operational phase, the environmental impacts associated with air quality will be **Low**. During the decommissioning phase, the environmental impacts associated with air quality will be **Low** if mitigation does not occur. However, if mitigation within the decommissioning phase occurs, the impact will be of **Low** significance.

Table 14: Anticipated environmental impacts associated with noise and vibrations of the proposed mining area on the receiving environment.

| 3.5.2. Noise and vibrations | | | | | | | |
|--|--|----------|----------|--------|--------------|------------|--------------|
| Impact | Vehicles and equipment utilized | | | | | | |
| Activities (not an all-inclusive list) | <ul style="list-style-type: none"> • Mining equipment working • Hauling trucks transporting vehicles • Loud music | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 4 | 2 | 3 | 2 | 6 |
| Mitigation | <ul style="list-style-type: none"> • All vehicles must be well maintained to prevent excess noise generated from machinery. • All local by-laws and regulations regarding the generation of noise and operating hours must be obeyed. • Work activities required outside of normal working hours and other major disturbance causing activities shall only be permitted where approved by the designated authority and with advance warning to adjacent residents. • Adequate ear protection should be provided to employees in noisy areas. No amplified music is permitted on site. • If Blasting occurs, the on-site environmental control officer and the health and safety consultant should be notified in advance. • Mining activities may only occur within normal working hours (7h00 – 17h00). • No Loud music on site. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 1 | 2 |
| Decommissioning Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 3 | 2 | 2 | 2 | 4 |
| Mitigation | <ul style="list-style-type: none"> • All vehicles must be well maintained to prevent excess noise generated from machinery. • All local by-laws and regulations regarding the generation of noise and operating hours must be obeyed. • Mining activities / rehabilitation activities may only occur within normal working hours (7h00 – 17h00). • No Loud music on site. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 2 | 2 | 1 | 2 | 1 | 2 |



| | |
|-------------------|-----|
| | |
| Additional Notes: | N/A |

Operational phase noise impacts will be of **Low-Medium** significance if no mitigation occurs. However, if mitigation occurs during the operational phase, the anticipated noise levels will be of **Low** significance. During the decommissioning phase, the anticipated noise impacts will be **Low** whether or not mitigation occurs.

3.6. Waste impacts:

Waste management refers to the types of waste being generated by the proposed mining area. This theme also investigates environmental impacts generated by the proposed mining area concerning specific waste management strategies employed throughout all phases of the project.









Table 15: Anticipated environmental impacts associated with general solid waste of the proposed mining area on the receiving environment.

| 3.6.1. General solid waste | | | | | | | |
|--|---|----------|----------|--------|--------------|------------|--------------|
| Impact | General solid waste pollution | | | | | | |
| Activities (not an all inclusive list) | <ul style="list-style-type: none"> Littering and general waste production Spent oil and or cleaning agents Used serviced parts and equipment Cleared vegetation and or other spoils | | | | | | |
| Operational Phase | | | | | | | |
| Before Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 4 | 1 | 2 | 2 | 4 |
| Mitigation | <ul style="list-style-type: none"> All personnel must be instructed to dispose of waste in a proper manner. Suitable receptacles must be provided in a convenient place and made available at all times. These receptacle bins must be regularly emptied, and waste disposed of at the local waste facility provided by the district municipality under the National Environmental Management: Waste Act, 2008 G No. R. 625, 2012. No waste may be disposed of in the surrounding area or veld. No waste may be buried on site. No burning of waste is permitted on site. Waste may not contaminate the stockpiles. All waste generated should be transported to an authorised landfill site. | | | | | | |
| After Mitigation | Status | Severity | Duration | Extent | Consequences | Likelihood | Significance |
| | Negative | 1 | 3 | 1 | 2 | 1 | 2 |
| Additional Notes: | The impacts of waste during the decommissioning phase are considered insignificant. However, during this phase the contractor should remain compliant with all relevant recommendations and mitigations as mentioned throughout this report, the EMPr and the EA. | | | | | | |

Operational phase environmental impacts associated with general solid waste will be of **Low** significance whether or not mitigation occurs. This is due to the very **low** potential for waste generation during operational activities of the proposed mining area. However, the potential for litter and pollution will still remain for as long as the mine remains active. Thus, mitigation should be implemented for the operational phase. The decommissioning phase is not anticipated to significantly influence the environmental impacts associated with general solid waste.

4. Risk assessment and conclusion:

Following is the key summary that was undertaken within the Impact Assessment to assess both positive and negative impacts anticipated from the proposed mining area conclude that:

-  The proposed mining area will influence roughly 4,16ha of variously disturbed area.
-  The proposed mining activity will impact the provincially protected flora as such, no mining operations must commence until all necessary flora permits have been obtained.
-  The proposed mining activity will, however, benefit the community of Kroonstad by allowing for the refurbishment of failing infrastructure in the area and regionally.
-  Strict monitoring and the effective implementation of all the mentioned mitigation measures will reduce the overall impact on the receiving environment.
-  The proposed project will have both positive and negative social impacts. It will create employment for locals during operational and closure and rehabilitation. The negative impacts are very low and restricted to the minor loss of grazing pasture.
-  According to the findings of the Heritage Specialist, the proposed mining activity covers part of an old borrow pit that has also been used as a dumping site. Old excavations indicate alternating sandstone, siltstone and mudstone beds with the latter showing varying degrees of induration resulting from the contact metamorphic effect of a local dolerite intrusion. Anticipated impact will have negligible negative effects if excavation is restricted to any remnant dolerite sheets but could have moderate negative effects on the remaining fossil-bearing, Adelaide Subgroup sedimentary strata and will require monitoring by a professional palaeontologist at appropriate times if large-scale excavations exceed 1 m into intact sedimentary rocks (Chance Find Protocol attached). As far as archaeological heritage is concerned; anticipated impact at proposed mining area will have negligible negative effects and will require no mitigation. The proposed development may proceed provided that all construction activities are restricted to within the boundaries of the demarcated site
-  The management of the impacts hinge on the effective and efficient operation of the proposed mining activity. There is a need to ensure that competent personnel are employed, and adequate training and skills development are provided for where it is lacking.
-  The cumulative significance of all the negative potential impacts on the environment is considered low due to the limited scale of the development and the scarcity of development in the immediate surrounding area.

No other alternatives were considered since a meticulous screening process was initiated, whereby all non-feasible alternatives were discarded. The positive impacts far outweigh the negligible environmental impacts that will be generated by the operations of the proposed mining area. Permitting and legalizing the proposed mining area will improve the quality of roads and storm water maintenance in the region. Therefore, all recommendations and mitigations as specified within the EMPr and Specialist reports should be included as conditions for authorization.