

*Appendix 5*



**IMPACT ASSESSMENT  
FOR THE:**

**PROPOSED BORROW PIT ON  
FARM BEERSHEBA No. 13,  
PORTION 2, LINDLEY  
MAGISTRIAL DISTRICT, FREE  
STATE PROVINCE**

**Free State Department of Community  
Safety, Roads and Transport  
Free State Province**

**Environmental  
Management  
Group (Pty) Ltd.**

**Prepared for:**

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## 1. Introduction:

The social and environmental impacts assessment generated by the proposed **borrow pit** is presented as the risk assessment methodology and associated results. This process aims to identify possible impacts associated with the proposed development and evaluate their significance to ensure appropriate mitigation is applied. The recommendations of suitable mitigation measures that should be implemented to reduce the consequences of likely impacts associated with the project have been formulated by industry best practice principles, professional experience, and relevant legislation.

This report describes the environmental impacts and risks identified during the environmental impact assessment carried out for the **proposed borrow pit**. Environmental Impact Assessment is a structured approach for obtaining and evaluating environmental information prior to its use in decision-making in the development process. This information consists, basically, of predictions of how the environment is expected to change if certain alternative actions are implemented and advise on how best to manage environmental changes if one alternative is selected and implemented.

Kindly note that borrow pit mining, typically does not include a construction phase and thus **no construction phase impacts can be assessed**. Rather, this impact assessment will focus on the actual operational and decommissioning impacts (mining and post mining phase) that will take place.

## 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 borrow pit 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.

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



### 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 borrow pit 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 borrow pit on the receiving environment.

3.1.1. Habitat loss							
Impact	Removal of natural elements leading to the destabilisation of the environment, ultimately leading to habitat loss.						
Activities (not an all-inclusive list)	<ul style="list-style-type: none"> <li>Physical clearance</li> <li>Erosion</li> <li>Habitat fragmentation</li> </ul>	<ul style="list-style-type: none"> <li>Poor rehabilitation techniques</li> <li>Excavations</li> <li>Trampling and off roading</li> </ul>					
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	4	8
Mitigation	<ul style="list-style-type: none"> <li>Restrict the mining area to the authorised footprint.</li> <li>No off roading or reckless driving is allowed on site.</li> <li>Establish a thorough fire prevention programme.</li> <li>Implement tool box talks with staff that focuses on environmental awareness.</li> <li>Implement erosion control measures.</li> <li>No disturbance related activity may occur within 30 m of any surface water resource.</li> <li>Adhere to the recommendations and mitigation listed in the EMPr and specialist assessments.</li> </ul>						
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	4	8
Mitigation	<ul style="list-style-type: none"> <li>Remove all site infrastructure from the mining area.</li> <li>Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species.</li> </ul>						



	<ul style="list-style-type: none"> <li>If rehabilitation is occurring to slow, then hydroseeding should be implemented during the rainy season.</li> <li>The post mining soils should be stabilised to prevent erosion.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	2	2	2
Additional Notes:							
Note that the proposed mining area will take place on a site that was previously utilised for borrow pit mining. As such little natural elements remain on site, therefore, limiting the innate impact significance on habitat loss.							

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 borrow pit 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"> <li>Physical clearance</li> <li>Erosion</li> <li>Habitat fragmentation</li> <li>Illegal poaching and gathering of plants and animals</li> </ul>			<ul style="list-style-type: none"> <li>Poor rehabilitation techniques</li> <li>Excavations</li> <li>Trampling and off roading</li> <li>Pollution and littering</li> </ul>			
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	3	6
Mitigation	<ul style="list-style-type: none"> <li>No illegal poaching/collecting of animals and plant material may be allowed.</li> <li>Conduct toolbox talks which focusses on environmental awareness.</li> <li>No pollution is allowed. All debris/ littered items should be removed from site to a registered landfill site.</li> <li>Erosion control should be implemented.</li> <li>Strict compliance to the EMP and specialist recommendations.</li> <li>Restrict mining to the authorised footprint.</li> <li>Strict compliance to the environmental authorisation's conditions.</li> </ul>						
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"> <li>Remove all site infrastructure from the mining area.</li> <li>Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species.</li> <li>If rehabilitation is occurring to slow, then hydroseeding should be implemented during the rainy season.</li> <li>The post mining soils should be stabilised to prevent erosion.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	1	1	1
Additional Notes:							
N/A							



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 registered borrow pit 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"> <li>Vegetation should be retained for as long as is possible.</li> <li>Areas to be excavated which require vegetation clearance should be kept to a minimum.</li> <li>When soil is being stripped, the top soil 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.</li> <li>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.</li> <li>Stockpiles should not be contaminated with oil, other fuels, litter, waste or other pollutants or contaminants.</li> <li>All other soil conservation techniques should be applied. Limit footprint to the authorized area.</li> <li>Dust control measures. Remedy through soil erosion and soil instability mitigation measures.</li> </ul>						
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"> <li>Overburden, subsoil and topsoil must be backfilled in levelled layers.</li> <li>Soil erosion mats must be placed in areas with steep slopes.</li> <li>Mulch and saved propagules must be placed with the top soil.</li> <li>All other soil conservation techniques and recommendations should be applied.</li> </ul>						
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**.

Even though the ecological impacts associated with soil erosion and soil instability will be Low after mitigation, the risk associated with soil erosion and soil instability are very

high. Soil erosion and instability is a serious risk to the site's recovery and its mitigation must be strictly followed.

### 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 borrow pit 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"> <li>Accidental destruction of below ground fossils due to excavations.</li> <li>Illegal poaching of heritage resources.</li> <li>Accidental destruction of surface scattered heritage resources.</li> </ul>						
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"> <li>SAHRA and a qualified archaeologist be consulted immediately in the event of accidental archaeological exposure.</li> <li>In the unlikely event of accidental archaeological exposure, all excavations should stop immediately.</li> <li>No loose chance finds such as stone age artefacts (arrow heads, stone flake blades etc.) may be collected.</li> <li>The on-site environmental representative should consult the appointed ECO regarding any such discoveries.</li> <li>All construction debris/ waste should be removed from site and may not be deposited in on-site excavated waste pits.</li> <li>Strict compliance to the conditions/recommendations and mitigations listed in the specialist report and EMPr.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	1	2	1	2
Additional Notes:	<p>The HIA specialist stated:  <b>“Archaeological / Cultural Status:</b> Given the degree of landscape degradation, the <b>site is not considered vulnerable</b> and is assigned an archaeological site rating of Generally Protected C (Significance: low / Mitigation: destruction).  <b>Palaeontological Status:</b> Significance is considered low under current conditions, and low if dolerite mining activities are renewed.”</p>						

Operational phase archaeological impacts of the proposed registered borrow pit 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. The proposed borrow pit's proximity to an artificially created impoundment within a natural stream system raises pertinent questions about the alteration of natural drainage patterns, which could potentially disrupt the equilibrium of surface water systems.

**Table 11:** The anticipated environmental impacts associated with surface water drainage of the proposed borrow pit on the receiving environment.

3.3.1. Surface and Ground Water Quality							
Impact	The disturbance of surface water drainage patterns, stream flows and or activities that cause ground water pollution.						
Activities (not an all inclusive list)	<ul style="list-style-type: none"> <li>Oil spills/ leaks in close proximity to water resources</li> <li>Surface water and ground water pollution</li> <li>Disrupting surface flow/ drainage path patterns</li> <li>Altering the surface topography</li> <li>Soil erosion and increased runoff causing increased turbidity and potentially eutrophication</li> </ul>						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	4	2	3	2	6
Mitigation	<ul style="list-style-type: none"> <li>Drip trays under stationary vehicles.</li> <li>Mining may not take place within 32 m from any surface water resource.</li> <li>Mining should be restricted to the authorised footprint.</li> <li>Erosion control measures should be implemented.</li> <li>All chemical / oil spills should be cleaned up immediately and disposed off at a facility authorised to receive chemical/ oil products.</li> <li>No burial of debris / waste.</li> <li>Disturbance related activities must stay at least 32 m from the nearest water resource.</li> <li>Spill kits should be present on site.</li> <li>Environmentally focused tool box talks should be held.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	1	2
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"> <li>Remove all site infrastructure from the mining area.</li> <li>Rehabilitation efforts should ensure that the post mining site is safe and will allow for the efficient reclamation of indigenous species.</li> <li>The post mining soils should be stabilised to prevent erosion.</li> <li>No hazardous waste or general waste / debris may be buried.</li> <li>All waste or items containing waste should be appropriately disposed off.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	1	1	1

Additional Notes:	N/A
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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 borrow pit excavation of the proposed borrow pit 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"> <li>Borrow pit mining</li> <li>Transport vehicles moving in and out of the site</li> <li>Overburden</li> <li>Erosion and vegetation trampling</li> </ul>						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	4	1	2	4	8
Mitigation	<ul style="list-style-type: none"> <li>Topsoil, overburden and mulch piles should be arranged around the edge of the excavation and kept separate from one another.</li> <li>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.</li> <li>Topsoil and mulch stock piles as well as open mining areas should be kept clear of alien and invasive species.</li> <li>Finish mining operations as soon as possible.</li> <li>Organise transport trips to minimise the amount of trips required.</li> <li>Remedy all erosion problems as soon as possible.</li> <li>Mining operations should remain within the authorised area.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	3	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"> <li>• During decommissioning of the borrow pit, the overburden, topsoil and mulch stock piles should be re-deposited into the excavation area in levelled layers with natural contours for each type of deposition.</li> <li>• Erosion control measures must also be considered and carried out during the backfilling of the topsoil and mulch deposition.</li> <li>• Backfilling of topsoil and mulch should be spread evenly throughout the excavated area to achieve natural contouring.</li> <li>• The sides of the excavated area must have slopes which blend with the surrounding area.</li> <li>• This can be achieved with the excavation sides being given flowing curves.</li> <li>• The site rehabilitation plan should be followed to improve overall visual aesthetics.</li> </ul>						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	1	2	1
Additional Notes:							
The proposed borrow pit area is located on an old-existing borrow pit. As such the environment was already impacted by historical borrow pit mining.							

Operational phase visual impacts associated with the visual appearance of the borrow pit excavation will be of **Low** significance whether or not mitigation occurs. During the decommissioning phase, visual impacts associated with the visual appearance of the borrow pit excavation will be of **Low** significance if mitigation does not occur. However, if mitigation occurs during the decommissioning phase, the visual impacts associated with the visual appearance of borrow pit excavation will be **Low**. Decommissioning phase environmental impacts associated with visual appearance of borrow pit excavation will be **Low-Medium** if mitigation does not occur. However, if mitigation occurs, the environmental impacts associated with surface water drainage 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 borrow pit.

**Table 13:** Anticipated environmental impacts associated with air quality of the proposed borrow pit 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"> <li>• Dust created by excavations</li> <li>• Dust created by hauling trucks</li> <li>• Removal of vegetation</li> </ul>						
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"> <li>Retain vegetation cover for as long as possible to maintain soil stability.</li> <li>Excavated topsoil should be kept in 2-3 m high windrows along the boundary edge of the proposed borrow pit area to avoid wind erosion.</li> <li>Stockpiles should not be placed along the edge or walls of the excavation area as this poses a health and safety risk to employees.</li> <li>Water or other dust suppression agents should be sprayed on areas with loose soil/ground to reduce dust emissions.</li> <li>Unnecessary excessive vehicle movement should be avoided.</li> <li>Speed of vehicles on unsurfaced roads should be reduced and vehicles should be given a corresponding speed limit.</li> <li>Equipment and vehicles must be maintained and kept in good working order to reduce excessive emissions.</li> <li>Fires are prohibited on site. All other dust control measures should be implemented.</li> </ul>						
1After 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, if 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 borrow pit 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"> <li>Mining equipment working</li> <li>Hauling trucks transporting vehicles</li> <li>Loud music</li> </ul>						
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"> <li>All vehicles must be well maintained to prevent excess noise generated from machinery.</li> <li>All local by-laws and regulations regarding the generation of noise and operating hours must be obeyed.</li> <li>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.</li> <li>Adequate ear protection should be provided to employees in noisy areas. No amplified music is permitted on site.</li> <li>If Blasting occurs, the on-site environmental control officer and the health and safety consultant should be notified in advance.</li> <li>Borrow pit mining activities may only occur within normal working hours (7h00 – 17h00).</li> <li>No Loud music on site.</li> </ul>						
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"> <li>All vehicles must be well maintained to prevent excess noise generated from machinery.</li> <li>All local by-laws and regulations regarding the generation of noise and operating hours must be obeyed.</li> <li>Borrow pit mining activities / rehabilitation activities may only occur within normal working hours (7h00 – 17h00).</li> <li>No Loud music on site.</li> </ul>						
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 borrow pit. This theme also investigates environmental impacts generated by the proposed borrow pit 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 borrow pit 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"> <li>Littering and general waste production</li> <li>Spent oil and or cleaning agents</li> <li>Used serviced parts and equipment</li> <li>Cleared vegetation and or other spoils</li> </ul>						
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"> <li>All personnel must be instructed to dispose of waste in a proper manner.</li> <li>Suitable receptacles must be provided in a convenient place and made available at all times.</li> <li>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.</li> <li>No waste may be disposed of in the surrounding area or veld.</li> <li>No waste may be buried on site.</li> <li>No burning of waste is permitted on site.</li> <li>Waste may not contaminate the stockpiles.</li> <li>All waste generated should be transported to an authorised landfill site.</li> </ul>						
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 borrow pit. However, the potential for litter and pollution will still remain for as long as the site 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 borrow pit mining area conclude that:

-  The old borrow pit area is found to be in a largely natural state with few signs of disturbance besides the landscape transformation and lack of several expected dominant grass species. Thus, the ecological functioning of the site is fair.
-  The old borrow pit will not affect any nationally protected flora, but will affect one provincially protected floral species according the findings of the specialist.
-  The old borrow pit will, however, benefit the community by allowing for the refurbishment of failing infrastructure.
-  Total vegetation clearance is expected to influence less than 4.9 ha.
-  Strict monitoring and the effective implementation of all the mentioned mitigation measures will reduce the overall impact on the receiving environment.
-  The development 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 degree of the landscape degradation, the site is not considered vulnerable and is assigned an archaeological site rating of Generally Protected C, significantly low.
-  The management of the impacts hinge on the effective and efficient operation of the borrow pit. 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. One of the primary negative impacts associated with the proposed borrow pit is the alteration of the environmental parameters such as clearance of area for mining/ removal of topsoil and loss of flora and faunal diversity. However, these consequences are relatively minor and low impact on a small 4,9ha scale that is being applied for environmental authorization and if comprehensive rehabilitation is applied by the Free State Department of Community Safety, Roads and Transport, and adhered to correctly, the potential risks can be deemed insignificant.

The positive impacts far outweigh the negligible environmental impacts generated by the operations of the proposed borrow pit. Permitting and legalizing the proposed borrow pit will stimulate the forthcoming development of the upgrading of the R707 road jointly creating temporary jobs is essential investing in the local economic growth, social development safety, and environmental sustainability, making it the cornerstone of infrastructure development in the region.

Therefore, all recommendations and mitigations as specified within the EMPr and Specialist reports should be included as conditions for authorization.