

APPENDIX 5

IMPACTS AND RISKS ASSESSMENT REPORT

Appendix 5



Environmental
Management
Group (Pty) Ltd.


**IMPACT ASSESSMENT
FOR:
PROPOSED REGISTERED
BORROW PIT IN STELLA FOR
NALEDI LOCAL
MUNICIPALITY, NORTH WEST
PROVINCE**

Naledi Local Municipality
Vryburg, North West Province


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1. Introduction:

The social and environmental impacts assessment generated by the proposed **registered 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.

Introduction.

This report describes the environmental impacts and risks identified during the environmental impact assessment carried out for the proposed registered 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. NEMA's EIA regulations requires that listed activities that have, or are likely to have a detrimental effect on the environment should be authorised and a license applied for before commencement. An EIA must be done as stipulated in the EIA regulations made under section 24(5) of NEMA. The EIA process used for this project refers to the process which involves the identification and assessment of direct, indirect and cumulative environmental impacts of a proposed project. In addition to this, the specific requirements for environmental assessments as stipulated in the Minerals and Petroleum Resources Development regulations were also taken into account to ensure that all aspects of the impacts and risks were taken into account.

The report contains the following appendixes to comply with the requirements of the Basic Assessment Report and Environmental Management Program.

APPENDIX 5.1: Methodology used in assessing the impacts of the proposed registered borrow pit.

APPENDIX 5.2: Assessment of the impacts and risks before and after mitigation.

APPENDIX 5.3: Mitigation measures for the associated aspects of impact.

Appendix 5.1: Methodology used in assessing the impacts of the proposed registered borrow pit.

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.

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

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.

APPENDIX 5.2: Assessment of the impacts and risks before and after mitigation. and

APPENDIX 5.3: Mitigation measures for the associated aspects of impact.

3. Impact assessment for the proposed registered borrow pit:

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 registered borrow pit is not anticipated to generate any impacts which may lead to ecological impacts greater than what was already lost 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 registered borrow pit on the receiving environment.

3.1.1. Habitat loss							
Impact	Loss of habitat and species diversity as a result of construction and the removal natural elements.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	4	1	2	3	6
Mitigation	Indigenous vegetation cleared from the proposed registered borrow pit area should be mulched and stored for use in rehabilitation. A rehabilitation and closure plan must be drafted and adhered to. Natural vegetation within the proposed borrow pit area should be retained for as long as possible before being cleared.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	1	1	3	3
Additional Notes:							

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 registered borrow pit on the receiving environment.

3.1.2. loss of indigenous flora and fauna							
Impact	Loss of indigenous floral and faunal diversity.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	3	1	2	2
Mitigation	During the mulching process of cleared vegetation seeds and propagules should be collected (where possible) to use in rehabilitation.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	3	1	2	1
Additional Notes:							

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 the loss of floral and faunal SCC of the proposed registered borrow pit on the receiving environment.

3.1.3. Loss of floral and faunal SCC							
Impact	The loss of protected species as a result of the proposed development.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	5	1	2	2
Mitigation	Before further operational activities commence, the protected tree individuals should be demarcated. Removal permits for all provincially and nationally protected flora and fauna should be obtained from the relevant permit authorising authority. Before further destruction occurs, and within the optimal flowering season for the possibly occurring floral SCC, a site walkthrough should be done by a qualified botanist. All staff should be informed on possibly occurring SCC and procedures to follow should they be observed. All other recommendations should also be followed.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	5	1	2	1
Additional Notes:							
	No SCC were observed within the proposed registered borrow pit area at the time of the site visit. However, the possibility or likeliness of occurrence still remains for these species.						

Operational phase environmental impacts on the loss of floral and faunal SCC will be **Low** with or without the implementation of mitigation measures. This is due to the absence of SCC at the time of the site visit. However, it is crucially necessary to implement monitoring and evaluation procedures to determine the potential risk increase. Potential risk increase may occur if possibly occurring SCC are found on site during operation. Should any possibly occurring SCC be found on site, the loss of floral and faunal SCC mitigation measures must be implemented with immediate effect.

Table 10: The anticipated ecological impacts associated with floral alien and invasive species of the proposed registered borrow pit on the receiving environment.

3.1.4. Floral alien and invasive species (AIS)							
Impact	Proliferation of exotic plant species due to environmental disturbance.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	3	6
Mitigation	An alien and invasive management plan must be drafted and adhered to. All cleared and barren areas within the proposed registered borrow pit area (including topsoil stockpiles) should be kept clear of alien and invasive species. The alien and invasive management plan must be put into effect immediately after its drafting to prevent further AIS invasions or establishments. Further establishment of alien and invasive species must be prevented to reduce the later cost of rehabilitation.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	1	2	2
Decommissioning Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	2	1	2	4	8
Mitigation	The alien and invasive management plan must be followed in accordance with the site closure and rehabilitation plan.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	1	1	1	2	2
Additional Notes:	Cleared and barren areas, which are prominent within borrow pit areas are highly susceptible to alien invasions and facilitate the rapid spread of alien and invasive species into surrounding areas.						

Operational phase ecological impacts on floral alien and invasive species will be Low-Medium for if no mitigation occurs. However, if mitigation measures are implemented in the operational phase, the ecological impacts on floral alien and invasive species will be Low. During the decommissioning phase ecological impacts on the floral AIS will be Low-Medium for if no mitigation measures are implemented. On the other hand, should mitigation occur, the ecological impacts on floral AIS will be Low.

Floral alien and invasive species are a serious theme that should not be taken lightly. The effects of AIS within a natural system can have disastrous effects on species which cascade into broader dynamic systems. It is the responsibility of the applicant to ensure that the spread of AIS within the proposed registered borrow pit does not exceed the authorised area.



Table 11: The anticipated ecological impacts associated with soil erosion and soil instability of the proposed registered borrow pit on the receiving environment.

3.1.5. 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	A soil erosion control plan needs to be drafted and adhered to. 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 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. 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.						
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	Overburden, subsoil and topsoil must be backfilled in levelled layers with natural concours. Soil erosion mats must be placed in areas with steep slopes. Mulch and saved propagules must be placed with the top soil. 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:							

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.

Operational phase ecological impacts will overall be **Low-Medium** without mitigation. However, if mitigation occurs during the operational phase for all ecological aspects the ecological impacts will be **Low**. Overall decommissioning phase ecological impacts will be **Low-Medium** when mitigation does not occur. However, if mitigation



occurs for all ecological aspects the ecological impacts will be **Low**. The overall ecological impacts for both phases will be Low-Medium without mitigation and Low with mitigation.

Table 12: Overall negative ecological impacts of the proposed registered borrow pit on the receiving environment are negative.

3.1.6. Negative ecological impacts							
Impacts	Operational Phase		Decommissioning Phase		Both Phases		
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Average Before Mitigation	Average After Mitigation	
	Habitat loss	6	3	N/A	N/A	N/A	N/A
Loss of indigenous flora and fauna	4	2					
Loss of floral and faunal SCC	4	2					
Invasive plant species	6	2	8	2	7	2	
Soil erosion and soil instability	9	4	6	2	8	3	
Total Average	6	3	7	2	7	3	
Impact significance category	Low-Medium	Low	Low-Medium	Low	Low-Medium	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 13: Anticipated archaeological impacts of the proposed registered borrow pit on subsurface heritage resources and surface artefacts of the receiving environment.

3.2.1. Loss of artefacts and fossils							
Impact	Destruction of any archaeological artefacts or fossils						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	5	1	3	1	3
Mitigation	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.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	4	1	2	1	2
Additional Notes:							

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.

Table 14: Overall anticipated negative archaeological impact of the proposed registered borrow pit on heritage resources of the receiving environment.

3.2.2. Negative heritage impacts							
Impacts	Operational Phase		Decommissioning Phase		Both Phases		
	Before Mitigation	After Mitigation	Before mitigation	After mitigation	Average Before Mitigation	Average After Mitigation	
Impact significance	Loss of artefacts and fossils	3	2	N/A	N/A	N/A	N/A
Impact significance category		Low	Low				

The overall impacts on archaeological components will be of **Low** significance whether mitigation occurs or not. These low scores are attributed to the low likelihood of finding fossils and artefacts of historical significance and the absence of above ground evidence of historically significant structures. Mitigation measures as indicated should be implemented.

3.3. Water resource impacts:

The water resource theme includes all aspects of freshwater including surface and groundwater resources. However, the proposed registered borrow pit is not anticipated to have any significant influence on groundwater resources. Thus, only surface water components will be discussed. Surface water drainage and surface water quality are two crucial components that are evaluated.

Table 15: The anticipated environmental impacts associated with surface water drainage of the proposed registered borrow pit on the receiving environment.

3.3.1. Surface water drainage disruption							
Impact	Drainage disruption and unnatural water body formation within the excavation area						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	4	1	3	2	6
Mitigation	A storm water management plan should be drafted and adhered to. Appropriate drainage provisions must be constructed to accommodate surface water movement to reduce overall water collection within the excavation area. Appropriate drainage provisions will also reduce soil instability due to soil water movement.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	1	2

Additional Notes:

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**. No greater environmental impacts associated with surface water drainage are anticipated from the decommissioning phase.

Table 16: The anticipated environmental impacts associated with surface water contamination of the proposed registered borrow pit on the receiving environment.

3.3.2. Surface water contamination							
Impact	The pollution of surface and groundwater resources due to the proposed development -particularly that of unnatural water body formation within the excavation area.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	4	1	2	1	2
Mitigation	A regularly maintained/exchanged chemical toilet must be provided for staff. The use of hazardous materials and chemicals in excavation and alien and invasive eradication activities should be restricted to prevent water contamination. All machinery entering the excavation must be regularly maintained to prevent oil leaks which could infiltrate ground water.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	1	2	1	2
Additional Notes:							

Operational phase environmental impacts associated with surface water contamination will be **Low** whether or not mitigation occurs or not. The decommissioning phase is not anticipated to have any greater significance than the operational phase. However, such impacts cannot be entirely excluded from either phase, as there will be potential for accidental events to occur.

Table 17: Overall anticipated negative environmental impacts associated with water resources of the proposed registered borrow pit on the receiving environment.

3.3.3. Negative water resources impacts							
Impact significance	Impacts	Operational Phase		Decommissioning Phase		Both Phases	
		Before Mitigation	After Mitigation	Before mitigation	After mitigation	Average Before Mitigation	Average After Mitigation
		Surface water drainage disruption	6	2	N/A	N/A	N/A
Surface water contamination	2	2					
Total average:	4	2					

Impact significance							
		Low	Low				

The overall anticipated environmental impacts associated with water resources of the proposed registered borrow pit on the receiving environment will be **Low** whether or not mitigation occurs.

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 18: Anticipated visual impacts associated with the visual appearance of borrow pit excavation of the proposed registered borrow pit on the receiving environment.

3.4.1. Visual appearance of borrow pit excavation							
Impact	Negative overall aesthetic value due to mining activities						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	2	4	1	2	4
Mitigation	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 stock piles as well as open mining areas should be kept clear of alien and invasive species. The decommissioning slope angle of 1:3 should be kept in mind when excavating from the sides of the borrow pit.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	3	6
Decommissioning Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	1	2	3	6
Mitigation	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. 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. Some landscaping with indigenous flora can be done to decrease the sites recovery time. The site's alien and invasive management plan should be followed to prevent alien and invasive species from out-competing indigenous flora.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	2	1	1	2	2
Additional Notes:							

Operational phase visual impacts associated with the visual appearance of the borrow pit excavation will be of **Low-Medium** 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-Medium** 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**.

Table 19: Overall anticipated visual impacts associated with negative aesthetics of the proposed registered borrow pit on the receiving environment.

		3.4.2. Negative aesthetics impacts					
		Operational Phase		Decommissioning Phase		Both Phases	
Impacts		Before Mitigation	After Mitigation	Before mitigation	After mitigation	Average Before Mitigation	Average After Mitigation
Impact significance	Visual appearance of borrow pit excavation	8	6	6	2	7	4
Impact significance category		Low-Medium	Low-Medium	Low-Medium	Low	Low-Medium	Low

Overall anticipated visual impacts of the proposed registered borrow pit will be Low-Medium if mitigation does not occur. However, if mitigation occurs for both phases, the overall visual impacts will be **Low**.

Before final operational completion, the appointed ECO should recommend the appropriate mitigation measures to be implemented during the decommissioning phase. This approach prevents any unnecessary expenditure to be placed on the applicant whilst retaining an overall low visual impact. Continual monitoring is required throughout all phases of this development.

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 proposed development.

Table 20: 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.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	4	1	3	3	9



Mitigation	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 registered borrow pit 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	2	4	1	2	2	4
Decommissioning Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	3	1	2	3	6
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	2	2	1	2	2	4
Additional Notes:							

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-Medium** if mitigation does not occur. However, if mitigation within the decommissioning phase occurs, the impact will be of **Low** significance.

During the operational phase and decommissioning phase, the proposed registered borrow pit is anticipated to have a Low-Medium impact significance due to the high potential of increased dust emissions. The efficient implementation of mitigation measures will lower the overall impact to a **Low** order impact significance.

Table 21: Anticipated environmental impacts associated with noise and vibrations of the proposed registered borrow pit on the receiving environment.

3.5.2. Noise and vibrations							
Impact	Vehicles and equipment utilized						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	2	4	2	3	2

Mitigation	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. Noise levels exceeding 85dB, 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.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	4	1	2	1	2
Decommissioning Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	2	2	2	4
Mitigation	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.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	2	1	2	1	2
Additional Notes:							

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.

Table 22: Overall anticipated environmental impacts associated with noise and air quality of the proposed registered borrow pit on the receiving environment.

3.5.3. Negative noise and air quality impacts							
Impacts	Operational Phase		Decommissioning phase		Both Phases		
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Average Before Mitigation	Average After Mitigation	
	Air quality	9	4	6	4	8	4
Noise and vibrations	6	2	4	2	5	2	
Total:	8	3	5	3	6	3	
Impact significance	Low-Medium	Low	Low	Low	Low-Medium	Low	

Overall, the anticipated environmental impacts associated with noise and air quality are of **Low-Medium** significance for if no mitigation occurs. However, if mitigation for both phases the anticipated environmental impact associated with noise and air



quality will be **Low**. The direct impacts of noise and air quality on the local community generated by borrow pits are of significance. However, as the site is not directly surrounded by residential zoned land, the impacts are considered to be of Low to Low-Medium significance.

3.6. Waste impacts:

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

Table 23: Anticipated environmental impacts associated with general solid waste of the proposed registered borrow pit on the receiving environment.

3.6.1. General solid waste							
Impact	General solid waste pollution						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	4	1	2	2
Mitigation	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 burning of waste is permitted on site. Waste may not contaminate the stockpiles.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
		Negative	1	3	1	2	1
Additional Notes:							
	In order to avoid posing a risk to the environment accessible receptacles must be readily available.						

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 registered 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.

Table 24: Anticipated environmental impacts associated with general solid waste of the proposed registered borrow pit on the receiving environment.

3.6.2. Negative waste impacts			
Impacts	Operational Phase	Decommissioning Phase	Both Phases

		Before Mitigation	After Mitigation	Before mitigation	After mitigation	Average Before Mitigation	Average After Mitigation
Impact significance	General solid waste	4	2	N/A	N/A	N/A	N/A
Impact significance category		Low	Low				

3.7. Socio-economic impacts:

Socio-economic impacts focusses on the effects the development will have on the economic drivers in the surrounding area as well as emphasising the integration of economic development concerning the needs of the people.

Table 25: Anticipated socio-economic impacts of the proposed registered borrow pit on the receiving community.

3.7.1. Socio-economic impacts							
Impact	Negative impacts associated with community conflicts and tensions, increased fire risk and reduced area security.						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	4	2	3	2	6
Mitigation	Job opportunities arising from the operation of the borrow pit must be fair, unbiased and indiscriminate to reduce possible conflicts within the community from arising. Job opportunities should be, as far as possible, given to local residents. Only if highly specialised skilled or qualified persons are required to do the job with no to few health and safety risks, should the work be outsourced. The outsourcing of work needs to be minimised by offering members of the community skills development training. However, at least one highly specialised, highly skilled or qualified person must be on site during operational hours. Measures should be put into place to ensure community safety regarding the borrow pit operational activities and increased site activity. In addition, responsible persons of the proposed registered borrow pit should regularly liaise with the community to address any possible issues that may have surfaced within that time period.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	2	2	1	2
Additional Notes:							

Operational phase socio-economic impacts are anticipated to be of **Low-Medium** significance for if no mitigation occurs. However, if mitigation occurs within the operational phase, the anticipated socio-economic impacts will be **Low**. The decommissioning phase is not anticipated to have a significance greater than that of

the operational phase. No positive socio-economic impacts can be considered using this category classification defined in the methodology (see section 2).

Table 26: Overall negative anticipated socio-economic impacts of the proposed registered borrow pit on the receiving community.

3.7.2. Negative socio-economic impacts							
Impacts	Operational Phase		Decommissioning phase		Both Phases		
	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation	Average Before Mitigation	Average After Mitigation	
Impact significance	Socio-economic impacts	6	2	N/A	N/A	N/A	N/A
Impact significance category		Low-Medium	Low				

Overall, negative socio-economic impacts are only anticipated for the operational phase of the proposed registered borrow pit. Thus, the anticipated socio-economic impacts remain of **Low-Medium** significance before mitigation is applied and of **Low** significance once mitigation occurs.

As mentioned above, the positive socio-economic impacts cannot be calculated using the same classification for the negative impacts. The potential for positive socio-economic impacts will still remain for as long as the site remains active. However, the direct positive impacts of the proposed registered borrow pit will be limited while the indirect impacts may only be seen long after the first excavations' material is put to use. Positive socio-economic impacts may directly result from job creation and enforced mine health and safety. Indirect impacts may arise from the use of mined materials for the development of local infrastructure.

4. Risk assessment and conclusion:

The overall environmental significance of the site concerns the above identified and quantified impacts that may arise from the proposed registered borrow pit. Overall impact is quantified using the sum of each impact category's average.

Table 27: Overall impact significance of the proposed registered borrow pit on the receiving environment.

4.1. Total combined impacts		
Factors	Impact Before Mitigation	Impact After Mitigation
Ecological impacts	7	3
Heritage impacts	3	2



Water resources impacts	4	2
Aesthetics impacts	7	4
Noise and air quality impacts	6	3
Waste impacts	4	2
Socio-economic impacts	6	2
Overall Impact	37	18

Overall, the combined anticipated impacts of the proposed registered borrow pit will be of **Low-Medium** significance for if no mitigation occurs. The significance score of 37 is on the low end of the Low-Medium category. This score is however, highly unlikely as environmental monitoring and supervision will be conducted and an Environmental Management Plan report will also be available to the contractors (adherence to the EMPr is legally compulsory). If all mitigation measures are implemented the overall impact is estimated to be **Low** which is regarded as insignificant.