Environmental Management Group

EMG

IMPACT ASSESSMENT FOR:

PROPOSED CATTLE FEEDLOT DEVELOPMENT ON FARM DOORNKOP NO. 148 – PARYS, FREE STATE PROVINCE

LW BOERDERY

Prepared for:

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Contents

1. Introduction:

The social and environmental impact assessment generated by the proposed development of a cattle feedlot on farm Doornkop 148, Parys, Free State Province, 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.

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

C = Overall consequence
L = Likelihood of occurrence

Equation 1: Calculation of environmental significance.

$$Environmental\ Significance = C \times L$$

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 the consequences. For determining the environmental significance in terms of consequence, the following factors were chosen:

- **Severity/Intensity;**
- **Duration;** and

- **Extent/Spatial Scale**.

Each factor is assigned a rating between 1 to 5, as described in the tables below.

2.1.1. Determination of intensity:

Intensity relates to the nature of the event, aspect or impact on the environment and describes how 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 a 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 in the absence of intervention/mitigation.

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 surroundings (site), extending to the surrounding area, regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 3: 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 (Equation 2).

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

Equation 2: Calculation of overall consequence.

$$Overal\ Consequence = \frac{\sum(\boldsymbol{I}+\boldsymbol{D}+\boldsymbol{E})}{\boldsymbol{n}}$$

2.1.5. Determination of likelihood:

Likelihood refers to the probability that a given aspect/impact will occur if 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 for this significance is to identify and quantify the sum of environmental impacts arising from the proposed development and recommend appropriate mitigation measures.

Table 5: Environmental significance evaluation score sheet.

Aspect Specific Environmental Significance	Low	Low-Medium	Medium	Medium-High	High
Overall 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.

Significance	Low	Low-Medium	Medium	Medium-High	High
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 for the preferred alternative:

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. The flora impact assessment refers to the vegetative component of the assessed area and focuses on the degree of infestation by exotics, vegetation structure, endemics, and protected species. The fauna impact assessment refers to the animal component and focuses on the available habitats, resources and protected species.

<table>
<tr><th colspan="8">Habitat loss</th></tr>
<tr><td>Impact</td><td colspan="7">Loss of habitat and species diversity because of construction and the removal natural elements.</td></tr>
<tr><td>Activities
(Not an all-inclusive list)</td><td colspan="7">• Physical clearance.
• Trampling
• Off-roading
• Habitat fragmentation leading to edge effects.
• Illegal harvesting of plant material.
• Habitat degradation.</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>3</td><td>2</td><td>2</td><td>2</td><td>4</td></tr>
<tr><td>Mitigation</td><td colspan="7">Removal of indigenous vegetation should be kept to a minimum.
Disturbance-related activities must be restricted to the authorised development site.
Cleared alien and invasive vegetation should be burned within a controlled area or removed from the site and taken to a registered waste facility.
Prioritise the use of existing service or single-track roads.
No off-roading or reckless driving should be allowed.</td></tr>
</table>

	• Post-construction open areas should be rehabilitated and revegetated with indigenous vegetation. • No harvesting of plant material should be allowed. • No illicit fires may be allowed during construction. • A fire management plan should be drafted and kept on site for all phases of the development. • All barren/unvegetated spaces cleared during construction, which also includes the creation of topsoil stockpiles, should be kept clear of vegetation. • Littering should be prohibited. • No burning of any material is allowed on site. • Regular maintenance, inspections, and removal of alien plants. Alien vegetation must be cleared on a regular basis. • An alien and invasive management plan should be drafted and implemented. • Construction activities should remain within the development boundary. • Adhere to mitigation measures outlined in the EMPr (Appendix G)						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	1	2	1	2

Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	5	1	2	1	2
Mitigation	The transformation of 90% of the development area into cultivated lands means that the operational phase of the cattle feedlot development is expected to have minimal impact and result in limited habitat loss, as the activities will be confined to the development boundaries. It is important to carry out rehabilitation of disturbed areas wherever possible.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	5	1	2	1	2
Additional Notes:	The construction footprints must be demarcated, and construction activities should remain within the area.						

The environmental impact on habitat loss during the construction and operational phases will be **Low** with pre- and post-mitigation measures, as indicated by the terrestrial ecologist. However, it is still necessary to implement monitoring and evaluation procedures to manage and monitor the potential increase in risk. It's important for the applicant to be aware of activities that may cause damage to the natural environment beyond the development area. Activities such as veld fires, water pollution, and plastic pollution need to be considered, and steps should be taken to greatly limit the potential for such adverse impacts to occur. Monitoring and evaluation procedures are necessary to determine the potential for increased risk throughout the development phases.

Invasive plant species							
Impact	Proliferation of exotic plant species due to environmental disturbance.						
Activities *(Not an all-inclusive list)*	• Improper eradication methods on existing exotics. • Physical clearance provides an opportunity for opportunistic exotics to proliferate. • Accidental spread. • Disruption of ecological balance due to habitat disturbance. • Slow response to infestation eradication.						
Constructional Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	2	2	3	6
Mitigation	• The vegetation on stockpiles needs to be eradicated from all vegetation on a three-monthly basis. • Disturbance-related activities may not exceed the authorised development boundary. • Exotics may not be allowed to proliferate within the development area. • Cleared alien and invasive vegetation should be burned within a controlled area or removed from the site and taken to a registered waste facility. • An alien and invasive management plan should be drafted and implemented.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	1	2	2	4
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	5	2	3	1	3
Mitigation	All open spaces post-construction need to be rehabilitated with indigenous species.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	5	1	2	1	2
Additional Notes:	Contain the natural environment and ensure the Environment Management Plan is adhered to.						

During the construction phase, the impact of invasive plant species is estimated to be **Low-Medium** without mitigation measures and **Low** when mitigation measures are implemented. The risk assessment for the operational phase is estimated to be low overall, both before and after implementing mitigation measures.

3.2. Heritage:

The heritage theme involves culturally significant finds, including, but not limited to, fossils, artefacts, and certain culturally relevant infrastructure. The Phase 1 Heritage Impact Assessment discusses the heritage theme in detail (Appendix D).

<table>
<tr><th colspan="8">Artefacts and Fossils</th></tr>
<tr><td>Impact</td><td colspan="7">Destruction of any archaeological artefacts or fossils</td></tr>
<tr><td>Activities
(Not an all-inclusive list)</td><td colspan="7">• Excavation within lower geological strata.
• Illegal collecting of loose chance finds (e.g. Stone age artefacts)</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>3</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td>Mitigation</td><td colspan="7">SAHRA and a qualified archaeologist must 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 may be collected, such as stone age artefacts (arrowheads, stone flake blades, etc.).
The on-site environmental representative should consult the appointed ECO regarding any such discoveries.
All construction debris/ waste should be removed from the site and may not be deposited in on-site excavated waste pits.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>3</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td colspan="8">Operational Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>5</td><td>1</td><td>1</td><td>1</td><td>2</td></tr>
<tr><td>Mitigation</td><td colspan="7">No loose chance finds, such as stone age artefacts (arrowheads, stone flake blades etc.), may be collected.
The on-site environmental representative should consult the appointed ECO regarding any such discoveries.
No unauthorised excavations or construction may be allowed.
Construction activities should be restricted to the development footprint.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>5</td><td>1</td><td>1</td><td>1</td><td>2</td></tr>
<tr><td colspan="8"></td></tr>
<tr><td>Additional Notes:</td><td colspan="7">According to the Phase 1 HIA report, the applicant and contractor should remain cognisant of this statement. Responsible excavation and other construction-related activities which reduce the likelihood of impacting heritage resources should always be implemented.</td></tr>
</table>

The paleoanthropological specialist stated that the likelihood of discovering significant paleoanthropological resources, including fossils and associated artefacts, is very low. The overall impact on these historical resources is also **Very Low**. The odd chance of finding loose surface scatters, such as Stone Age arrow heads and stone flake knives, was regarded by the HIA specialist as of **Low significance**. Nonetheless, a

conservative approach needs to be retained, as this prevents heritage resources from being viewed in a casual light. The overall impacts on archaeological components will be **Low** prior to any mitigation and **Low** after mitigation. These low scores are attributed to the scarce 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.

Heritage cumulative impacts
The overall cumulative impact associated with the archaeological aspect of the proposed development is negative due to the anthropogenic disturbances during mostly the constructional phase. The proposed development will not generate any positive impacts on the heritage aspect. The significance impact score was overall **Low.**

3.3. Water resources:

The water resource theme includes all aspects of freshwater including surface and groundwater resources. Water quality and quantity are two crucial components that are evaluated.

<table>
<tr><th colspan="8">Surface and groundwater quality</th></tr>
<tr><td>Impact</td><td colspan="7">The pollution of surface and groundwater resources due to the proposed development.</td></tr>
<tr><td>Activities (Not an all-inclusive list)</td><td colspan="7">• Removal of riparian vegetation
• Soil erosion
• Manure runoff and other forms of water pollution (refer to organic waste in 3.7)</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>6</td></tr>
<tr><td>Mitigation</td><td colspan="7">A stormwater management plan should be implemented to avoid the increased runoff from eroding soils.
Soil erosion prevention should be implemented.
Soil polluted with hazardous substances, such as fuel, oil, paint, etc., should be removed and managed as hazardous waste—i.e., stored in the hazardous waste disposal area.
Waste must be collected and stored in waste bins/skips prior to disposal to prevent soil contamination.
On completion of construction work, all areas that are prone to erosion must be re-vegetated with indigenous species.
Anti-erosion measures must be implemented in areas where erosion is observed or is likely to occur, especially on topsoil, subsoil, and other stockpile areas.
Chemical toilets must be available during construction.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>2</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td colspan="8">Operational Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>3</td><td>5</td><td>2</td><td>3</td><td>2</td><td>6</td></tr>
<tr><td>Mitigation</td><td colspan="7">The proponent or responsible person operating the feedlot should draft and maintain a monitoring programme.
A baseline groundwater test should be conducted, and biannual tests thereafter should be implemented to assess the possibility of groundwater pollution.
Biannual water level monitoring should be conducted at a monitoring borehole to evaluate water level trends.
Pen interface layer should be maintained to ensure water run-off is sufficient,
Pens should be cleaned of loose manure and deposited in the manure storage area.
Sedimentation ponds should be maintained and cleaned once they reach 70% capacity.
Water in the holding pond should be utilised before overflow can occur.
The composting area must be maintained and monitored, and any accumulated water puddles should be removed.
E-coli test should be done regularly to ensure pathogen spread and leakage does not occur.</td></tr>
<tr><td>After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
</table>

	Negative	2	5	2	3	2	6
Additional Notes:	No rivers, streams or wetlands are present on site.						

The main risk to groundwater quality will be associated with surface activities, such as manure runoff. If not managed correctly, this runoff can infiltrate into the aquifer over time, potentially contaminating the entire aquifer depending on the amount. Implementing mitigation measures during such incidents is crucial to prevent other groundwater users in the area from being negatively affected by poor-quality water.

During the construction phase of the development, it is estimated that the impact on surface and groundwater quality is of **Low to Medium significance** before mitigation and **Low** after mitigation. In the operational phase, the impact on water resources is calculated to be of **Low to Medium significance**. The mitigation measures outlined in the impact assessment, Environmental Management Plan and those identified in the Basic Assessment Report should be followed.

Water resources cumulative impacts
The proposed development is expected to have a **Low to Medium** impact on water resources before implementing mitigation measures during the operational phase. Adequate mitigation measures are crucial to keeping the impact at a **Low to Medium** level. Although the overall impact of the development on water resources can be negative if not mitigated accordingly, it is worth noting that the development area is not situated in close proximity to a watercourse. Strict mitigation measures should be implemented to prevent the contamination of water resources.

3.4. Aesthetics:

The aesthetic theme is focused on the alteration of the area's visual characteristics and the overall impact on landscape appreciation. Landscape appreciation is inherently subjective, with few metrics allowing for an objective impact assessment. However, several aspects concerning visual impacts associated with feedlot developments may be objectively assessed. These include development size, aesthetic deterioration due to construction, and line of sight distance.

Construction of Infrastructure							
Impact	The alteration of landscape appreciation, visual deterioration, and visual impacts from the feedlot development.						
Activities *(Not an all-inclusive list)*	• Construction • Generation of construction debris/waste • Temporary waste storage areas • Visual impairments from feedlot and associated infrastructure • Removal of vegetation • Alteration of the overall landscape perspective						
Constructional Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	3	2	2	3	6
Mitigation	• Construction debris should be removed regularly and not allowed to pile up. • A designated construction waste area should be allocated away from the stockpiling area and demarcated. • All domestic waste and construction debris should be removed to a designated waste landfill site. • Complaints register needs to remain on-site in which all complaints raised by the public are to be filed. • Construction should finish as quickly as possible. • All open spaces after construction need to be revegetated with indigenous vegetation. • Construction activities should remain within the development footprint. • Access routes must be used to limit vegetation disturbance outside affected areas. • Vehicles are to be restricted to existing access roads.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	1	3	2	2	2	4
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	5	2	3	2	6
Mitigation	• Trees should be planted between immediate neighbouring farms and the feedlot to function as a dense wall to minimise the visual impact.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	5	1	3	1	3
Additional Notes:	The proposed feedlot will be developed on a farm. The area is surrounded by several farms and will, therefore, blend with the agricultural surrounding area.						

The potential risk to the visual appeal of the surrounding environment during the construction phase of the development is initially assessed as **Low-Medium** but is reduced to a **Low** level after mitigation measures are put in place. These scores were determined based on the location of the new feedlots on farmland within an agricultural community surrounded by cultivated fields. The operational phase of the proposed development is expected to have a slightly higher visual impact. During this phase, the impact on the aesthetic value of the surrounding area is considered **Low-Medium** before mitigation but is rated **Low** when mitigation measures are implemented.

Aesthetics cumulative impacts
The cumulative aesthetic impacts on the development area and the overall landscape are **Low to Medium** before mitigation measures are implemented. After the implementation of these measures, the impact is reduced to **Low** significance. The impact will have a negative effect on the surrounding area due to the proximity of the neighbours. The feedlot will be visible after construction and will stand out from the surrounding cultivated fields. However, it will be in an area where agricultural activities are encouraged.

3.5. Air quality and noise:

Noise and air quality assessments are based on 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>
<tr><th colspan="8">Air quality</th></tr>
<tr><td>Impact</td><td colspan="7">Additional air pollution introduced due to the mobilisation of vehicles, land clearance and the smell of cattle manure.</td></tr>
<tr><td>Activities (Not an all-inclusive list)</td><td colspan="7">• Elevated dust emissions due to increased vehicle movement
• Vegetation clearance and the construction of internal dirt roads.
• Increased manure production and associated smell.</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>3</td><td>2</td><td>2</td><td>2</td><td>4</td></tr>
<tr><td>Mitigation</td><td colspan="7">Areas cleared of vegetation must be wet down to prevent excessive dust during construction; suppression measures must be implemented, including periodic wetting of exposed soils.
Enforce a speed limit of 20 km/h and optimise the working schedule to reduce vehicle mobilisation.
Limit the clearance of vegetation to only necessary areas.
The construction of new dirt roads should be restricted by prioritising existing roads.
Development should remain within the authorised area.
Construction should be completed as soon as possible.
Cleared vegetation and open areas susceptible to wind-blown dust must be rehabilitated and stabilised as soon as possible.
Stockpiled material must either be covered or wet down to prevent dust particulates from entering the atmosphere.
Construction vehicles must be maintained to prevent excessive release of emissions.
No burning of waste shall be allowed on site.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>3</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td colspan="8">Operational Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>3</td><td>5</td><td>2</td><td>3</td><td>4</td><td>12</td></tr>
<tr><td>Mitigation</td><td colspan="7">Enforce a speed limit of 20 km/h and optimise the working schedule to reduce vehicle mobilisation.
Parking areas should be demarcated and strictly controlled so vehicles are limited to specific areas.
Implement biofilters or vegetative buffers around the feedlot to help capture and absorb odorous compounds. Planting trees, shrubs, and other vegetation can help filter and neutralise odours.
Frequently wet bare surface area to prevent dust accumulation from vehicle movement.
Promptly remove and properly manage manure to minimise its contact with air. Frequent manure removal reduces the production of odorous gases.
Maintain an even pen floor surface to ensure rapid drying of manure, as wet manure releases more odour
Regularly remove manure and waste materials to keep the feedlot clean. Cleaning pens regularly helps prevent the buildup of odour-causing compounds.</td></tr>
</table>

	▲ Clean sedimentation ponds once they reach 70% capacity to prevent the buildup of manure and odour. ▲ Clean drainage lines regularly to prevent manure and sediment buildup, which could lead to increased odours. ▲ Ensure the composting area is maintained and has sufficient runoff to ensure sufficient drying ▲ In the event of precipitation, it is advisable to remove manure from pens to prevent further odour accumulation. ▲ Don't spread sewage on windy days. ▲ Holding pond water should not be irrigated on windy days.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	5	2	3	2	6

The movement and activities of construction vehicles and the increased production of manure during the operational phase of the proposed development will affect the air quality. However, these impacts are not expected to be significantly higher than the existing impact on the environment's air quality. The impacts during the construction phase of the proposed development are considered **Low** both before and after mitigation measures.

The impacts during the operational phase are deemed to be **Medium** before mitigation and **Low to Medium** after the implementation of mitigation measures. Despite the potential increase in movement and activities during this phase, proper mitigation measures can reduce the overall impact. It is crucial to ensure that all necessary mitigation measures are implemented, especially during the operational phase of the development. The applicant is responsible for consistently assessing and implementing industry best practice mitigation measures to minimise the overall impact on air quality.

Noise and vibrations							
Impact	Vehicles and equipment utilised and noises associated with cattle.						
Activities *(Not an all-inclusive list)*	• Noise generated through construction-related activities. • Vibrations generated due to the utilisation of construction equipment. • Noises of cattle in the feedlot pens.						
Constructional Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	3	2	3	3	9
Mitigation	▲ No loud music allowed on-site. ▲ Vehicles must be maintained in such a manner as not to cause excessive noise when operating them. ▲ Select 'quiet' construction equipment and working methods to avoid unnecessary revving and hooting. ▲ Adequate speed signs should be distributed throughout the site. ▲ Working schedule for activities with high noise levels will be limited to 07:00 AM to 17:00 PM, machinery should be serviced regularly during the construction stage. Equipment should be regularly serviced.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance

	Negative	2	3	1	2	2	4
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	3	5	2	3	2	6
Mitigation	- No unnecessary hooting and revving - Implement scheduling and operational practices that minimise noisy activities during periods when noise-sensitive areas are most affected, such as early morning or late at night. - Vehicles must be maintained in such a manner as not to cause excessive noise when operating them. - Adequate signage and speed bumps must be provided around the feedlot development to limit fast vehicle movement and avoid simultaneous noisy activities. - Utilize natural barriers like trees, shrubs, and earthen berms to help block and absorb sound. - Create buffer zones between the feedlot and neighbouring properties. Vegetation that acts as a noise barrier can be planted in these areas. - Properly manage animal handling and movement to minimise noise. This could involve using quieter techniques and equipment. - Consider grouping animals based on behaviour and size to reduce vocalisations and stress-related noise.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	5	1	3	1	3

During the construction phase, the assessment indicates that the environmental impact on ambient noise is expected to be categorised as **Low to Medium** prior to mitigation efforts, and **Low** after mitigation measures are implemented. As for the operational phase, the environmental impact on ambient noise is projected to fall within the **Low to Medium** range before any mitigation, and **Low** after mitigation is in place. The noise and vibration levels in the area are primarily due to the regular maintenance, ploughing, and harvesting of cultivated fields using tractors. These activities contribute significantly to the overall environmental noise and vibration. As a result, the impact of the feedlot operations on the surrounding area is expected to be minimal in comparison.

Air quality and noise cumulative impacts
The proposed development is expected to have an overall negative impact due to human and cattle-related activities that disturb and pollute the natural environment. The air quality of the development will be negatively affected by the operational and construction phase. However, if proper mitigation measures are strictly followed during both the construction and operational phases, the significance of the impact will be considered **Low**.

3.6. Socio-economic:

Socio-economic impacts focus on the effects the development will have on the economic drivers in the surrounding area and emphasise the integration of economic development with the people's needs.

Job creation and the influx of job seekers							
Impact	Impacts associated with the need for locally appointed construction/ operation workers.						
Constructional Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Positive	4	3	2	3	4	12
Mitigation	Transparent, fair recruitment and procurement practices. The contractor chosen should maximise the involvement of local communities in construction and support activities, to the extent possible, based on available skill levels. Training programmes that will benefit both construction stage skills requirements and long-term employment demand should be developed whenever possible.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	N/A						
Operational Phase							
Before Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Positive	3	5	2	3	4	12
Mitigation	Each worker should be required to abide by a Code of Conduct, which will limit unsavoury activities in local towns and communities and restrict certain behaviours in the work sites and accommodation.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	N/A						
Additional Notes:	Maintenance of feedlot structures creates job opportunities for local businesses. Operational functions and managing the feedlot daily create more job opportunities and financial stability for local employees.						

The proposed development of cattle feedlot construction and operation provides for several socio-economic benefits such as local job creation, boosting local spending, skills training, and addresses the national food security of South Africa. It is therefore considered that the construction phase of this project will have a **Medium** positive impact on the local socio-economic sphere during both the constructional and operational phases of the development.

Socio-economic aspect cumulative impacts
The proposed project will have an overall positive impact on the socio-economic aspect by creating job opportunities, increasing local spending, providing training, fostering economic growth, and addressing food security for the growing local population.

3.7. Waste:

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>
<tr><th colspan="8">General solid waste</th></tr>
<tr><td>Impact</td><td colspan="7">General solid waste pollution</td></tr>
<tr><td>Activities (Not an all-inclusive list)</td><td colspan="7">• General construction waste such as plastic items, cement bags, construction scrap etc.
• Designated temporary construction waste dump area.
• General operational waste (plastic items, paper, broken panels / equipment etc.)
• Waste removal management.</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>3</td><td>2</td><td>2</td><td>3</td><td>6</td></tr>
<tr><td>Mitigation</td><td colspan="7">Reduce, reuse, and recycle strategy needs to be implemented.
Waste receptacles must be made available, and all waste shall be adequately stored and removed.
General site clean-up must be conducted on a daily basis.
All waste management strategies employed by the contractor should comply with environmental / waste management legislation.
Waste that can easily be dispersed by wind should be appropriately discarded in bins with lids.
The contractor must provide adequate waste collection facilities on site to efficiently collect and store waste prior to disposal. Construction waste (i.e. building rubble) must be separated from domestic waste.
Waste should be regularly removed from the site to a registered landfill.
The contractor should develop and comply with an on-site specific waste management plan.
No waste may be buried in an on-site waste pit.
No burning of waste material on site.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>3</td><td>1</td><td>2</td><td>2</td><td>4</td></tr>
<tr><td colspan="8">Operational Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>2</td><td>5</td><td>2</td><td>3</td><td>2</td><td>6</td></tr>
<tr><td>Mitigation</td><td colspan="7">General waste generated during routine maintenance should be transported to a designated waste storage area and may not be burned.
Waste should be transported to a registered landfill site.
General waste should also be removed from the site and not pile up.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>5</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
</table>

The expected impact of general waste production during construction is estimated to be **Low to Medium** before mitigation measures and **Low** after mitigation measures have been implemented. Similarly, the impact of general waste production during the operational phase is considered **Low to Medium** before mitigation measures and Low after mitigation measures have been implemented. Implementing monitoring and evaluation procedures to assess the potential increase in risk over the duration of the facility's operation is essential.

<table>
<tr><th colspan="8">Organic waste (manure)</th></tr>
<tr><td>Impact</td><td colspan="7">Land contamination</td></tr>
<tr><td>Activities (Not an all-inclusive list)</td><td colspan="7">• Designated temporary manure storage area.
• Waste removal management.
• Spoilt silage
• Mortalities</td></tr>
<tr><td colspan="8">Constructional Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>3</td><td>1</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Mitigation</td><td colspan="7">The new feedlots will only begin producing organic waste (manure) once the relevant authority approves the project and construction is finished.</td></tr>
<tr><td rowspan="2">After Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>1</td><td>3</td><td>1</td><td>2</td><td>1</td><td>2</td></tr>
<tr><td colspan="8">Operational Phase</td></tr>
<tr><td rowspan="2">Before Mitigation</td><td>Status</td><td>Severity</td><td>Duration</td><td>Extent</td><td>Consequences</td><td>Likelihood</td><td>Significance</td></tr>
<tr><td>Negative</td><td>3</td><td>5</td><td>3</td><td>4</td><td>4</td><td>16</td></tr>
<tr><td>Mitigation</td><td colspan="7">A comprehensive stormwater management network should be implemented and regularly inspected for faults.
To prevent seepage, the stormwater channels should be lined with clay or any other suitable impermeable material. The sedimentation pond, evaporation pond, and temporary storage/drying area should also be lined.
Dried manure should not be unutilised for more than four months. Unutilised manure stockpiles should be sold or, at the very least, be given away to other farmers for secondary use. The last option would be to transport the manure to an appropriate waste-handling facility.
Sedimentation ponds should be cleaned and maintained once capacity reaches 70%.
Drainage lines need to be kept free of sediment and manure buildup to maintain maximum flow capacity.
Pens should be cleaned of manure and deposited in designated dry manure storage areas.
Pen should be cleaned every 3 months when manure is moist to ensure easy removal of manure and minimum disruption to pen layer surface.
For easy management, manure can be mounded in pens to ensure regular cleaning and confident removal.
Spoilt silage should be removed and deposited at the composting area.
Mortalities should be removed immediately from the pens and can be utilised in the composting area or buried or be donated to the nearest wildlife farm.</td></tr>
</table>

	▲ Record the date of each manure deposit at the composting windrow to monitor the management of compost.						
After Mitigation	Status	Severity	Duration	Extent	Consequences	Likelihood	Significance
	Negative	2	5	2	3	2	6
Additional Notes:	The waste management strategy must include the reduce, reuse, and recycle model. Health and safety regulations should also be followed.						

The environmental impact of producing manure from a cattle feedlot is a significant aspect to consider. The construction phase of the proposed development is rated as having **Low** significance because no manure is produced at this stage. However, during the operational phase, the production of manure results in a **Medium-High** significance before mitigation efforts are applied. After mitigation, the significance decreases to a **Low-Medium** level.

Waste cumulative impacts
Overall, the cumulative impact generated by the proposed project on the environment's waste aspect is negative. The main cause of this is rooted in the anthropogenic activity during the construction phase resulting in the increase of waste generated and the generation of manure during the operational phase of the proposed development. A comprehensive stormwater plan should be implemented to prevent concentrated organic waste (manure) from entering lower soil strata. The overall significance of this development ranges from **Medium** to **Low** which generates a negative impact associated with this development. Most of these impacts may be easily mitigated, resulting in a **Low-Medium** impact significance.

3.8. No go alternative:

The no-go alternative assumes that the proposed project will not go ahead, i.e. it is the option of not constructing the proposed development. This alternative would result in no environmental impacts on the site or the surrounding local area. It provides the baseline against which other alternatives were compared. The following implications will occur if the “no go” alternative is implemented:

- The cattle feedlot will not provide additional food security to South Africa.
- This will further enforce more strain on the local communities.
- Socio-economic benefits such as job creation, skills development, and local economic growth will be lost.

Besides the above-mentioned, the following benefits might occur if the no-go alternative is implemented:

- No vegetation will be removed and or disturbed.
- No change/ alteration to the existing landscape.
- No additional construction waste will end up in landfill sites

While the no-go alternative will not generate any negative environmental impacts, it will surely remove any socio-economic benefit the local community will receive. The no-go alternative will also not aid the government in addressing the national food security matter and job creation. Therefore, the no-go alternative is not considered the preferred alternative.

3.9. Conclusion

The overall impact of the proposed development is negative, although implementing adequate mitigation measures generates a lower significant impact. The overall benefits arising from the proposed development include food security, job creation, and economic revenue.