

# DPR

**Ecologists & Environmental Services**

## **Report on the ecological assessment of a proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort, Free State Province.**

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## DECLARATION OF INDEPENDENCE

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## **Executive Summary**

The site proposed for the poultry facility has been rated as being preferred for this development. This is mostly as a result of the highly degraded condition of the site and transformation of the natural vegetation.

The site consists mostly of indigenous vegetation but with an altered vegetation structure in terms of the natural vegetation type. The site currently consists of a small paddock with approximate size of 1.5 hectares which is being used to keep sheep. This land use has clearly caused significant transformation of the natural vegetation. The vegetation is dominated by a short dwarf karroid shrub layer with a very short grass layer. This can mostly be attributed to grazing by sheep which keeps the grass layer short and encourages the dominance of dwarf shrubs. Trampling also decreases the vegetation cover and grass height. This has almost completely transformed the natural species composition. Another significant impact on the site is the previous shallow excavation of calcrete (Map 1). This was evidently undertaken a long time ago but the topography has nonetheless been permanently transformed here.

The proposed poultry facility will be located on the Farm Tochgeluk 37/0 which is located approximately 13 km to the south west of the town of Brandfort (Map 1). Access to the site is gained by a small dirt road turning off from the R30 tarred road. The site is located adjacent to a farmstead which is considered a transformed area. As described the vegetation structure is dominated by a short, dwarf karroid shrub layer with a short lawn-type grass layer. Exotic weeds are also common.

In view of the site being situated in a Threatened Ecosystem and Critical Biodiversity Area 1 (CBA 1) it may be beneficial to attempt to rehabilitate or restore the site to its natural condition (Map 2 & 3). However, due to the transformation of the topography and the sites proximity to the farmstead this is not considered a feasible alternative.

From the survey of the site and the recorded species composition and vegetation structure the following conclusions can be made about the vegetation on the site. The vegetation type on the site is considered to form part of a Threatened Ecosystem and is also listed as a Critical Biodiversity Area 1 (CBA 1) (Map 2 & 3). This would normally entail an area of high conservation value. However, these mapping resources are compiled at a coarse scale and on-site surveys often indicate that areas have been transformed and no longer has a significant conservation value. The site in question has been utilised as a sheep paddock for a long period and contains portions which has been subjected to calcrete excavations. This has caused extensive degradation of the vegetation and has largely transformed the natural vegetation on the site. The site therefore no longer contains elements which would justify its inclusion in a Threatened Ecosystem or CBA. Rehabilitation of the site to its natural condition would be difficult to attain due to on-site excavations and is considered unfeasible. From the survey of the site it is clearly in a highly degraded condition and does not contain elements of significant conservation value. The proposed development cannot be considered to have a high impact on the site in terms of ecology and vegetation.

The impact significance has been determined and almost all impacts is anticipated to remain low with the exception of the likely establishment of exotic weeds. With adequate mitigation, i.e. weed monitoring and eradication, this can also be decreased to a low impact.

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## **Ecological assessment**

### **1. INTRODUCTION**

#### **1.1 Background**

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa has a large amount of endemic species and in terms of plant diversity ranks third in the world. This has the result that many of the species are rare, highly localised and consequently endangered. It is our duty to protect our diverse natural resources.

South Africa's water resources have become a major concern in recent times. As a water scarce country, we need to manage our water resources sustainably in order to maintain a viable resource for the community as well as to preserve the biodiversity of the system. Thus, it should be clear that we need to protect our water resources so that we may be able to utilise this renewable resource sustainably. Areas that are regarded as crucial to maintain healthy water resources include wetlands, streams as well as the overall catchment of a river system.

Development of livestock and poultry facilities are necessary to feed an ever-growing population. This promotes food security and contributes to the economy. Areas used for intensive agricultural activities are often degraded due to the clearing of the natural vegetation required for these activities. Though this may often be the case portions of remaining natural vegetation may still consist of sensitive habitats such as watercourses, wetlands or rare vegetation types that need to be conserved. These areas may also contain endangered fauna and flora.

The proposed poultry facility will be located on the Farm Tochgeluk 37/0 which is located approximately 13 km to the south west of the town of Brandfort (Map 1). Access to the site is gained by a small dirt road turning off from the R30 tarred road. The site still contains natural vegetation but has been significantly degraded as it is being utilised as a sheep paddock and has been affected by shallow excavations.

A site visit was conducted on 3 September 2018. The entire footprint of the site was surveyed over the period of several hours. The site survey was conducted at the beginning of spring and consequently several plant species may not have been identifiable. However, on-site results indicate that a good representative vegetation assemblage was present

For the above reasons it is necessary to conduct an ecological assessment of an area proposed for development.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed development.

## **1.2 The value of biodiversity**

The diversity of life forms and their interaction with each other and the environment has made Earth a uniquely habitable place for humans. Biodiversity sustains human livelihoods and life itself. Although our dependence on biodiversity has become less tangible and apparent, it remains critically important.

The balancing of atmospheric gases through photosynthesis and carbon sequestration is reliant on biodiversity, while an estimated 40% of the global economy is based on biological products and processes.

Biodiversity is the basis of innumerable environmental services that keep us and the natural environment alive. These services range from the provision of clean water and watershed services to the recycling of nutrients and pollution. These ecosystem services include:

- Soil formation and maintenance of soil fertility.
- Primary production through photosynthesis as the supportive foundation for all life.
- Provision of food, fuel and fibre.
- Provision of shelter and building materials.
- Regulation of water flows and the maintenance of water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Detoxification and decomposition of wastes.
- Pollination of plants, including many crops.
- Control of pests and diseases.
- Maintenance of genetic resources.

## **2. SCOPE AND LIMITATIONS**

- To evaluate the present state of the vegetation and ecological functioning of the area proposed for the poultry facility.
- To identify possible negative impacts that could be caused by the proposed construction of a poultry facility.

### **2.1 Vegetation**

Aspects of the vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the proposed site.
- The overall status of the vegetation on site.
- Species composition with the emphasis on dominant-, rare- and endangered species.

The amount of disturbance present on the site assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

### **2.2 Fauna**

Aspects of the fauna that will be assessed include:

- A basic survey of the fauna occurring in the region using visual observations of species as well as evidence of their occurrence in the region (burrows, excavations, animal tracks, etc.).
- The overall condition of the habitat.
- A list of species that may occur in the region (desktop study).

### **2.3 Limitations**

The survey was undertaken at the start of the rainy season and it may be possible that several annual or geophytic species may not yet be present or identifiable and may therefore have been overlooked.

Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature.

Although a comprehensive survey of the site was done it is still likely that several species were overlooked.

Some animal species may not have been observed as a result of their nocturnal and/or shy habits.

### **3. METHODOLOGY**

#### **3.1 Several literature works were used for additional information.**

Vegetation:

Red Data List (Raymondo *et al.* 2009)

Vegetation types (Mucina & Rutherford 2006)

Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Fish *et al* 2015, Gibbs-Russell *et al* 1990, Manning 2009, Retief & Meyer 2017, Van Oudtshoorn 2004, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997, Venter & Joubert 1985).

Terrestrial fauna:

Field guides for species identification (Smithers 1986a, Child *et al* 2016).

#### **3.2 Survey**

The site was assessed by means of transects and sample plots.

Noted species include rare and dominant species.

The broad vegetation types present on the site were determined.

The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.

Animal species were also noted as well as the probability of other species occurring on or near the site according to their distribution areas and habitat requirements.

The state of the habitat was also assessed.

#### **3.3 Criteria used to assess sites**

Several criteria were used to assess the site and determine the overall status of the environment.

##### **Vegetation characteristics**

Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.

Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single niche – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.



Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.

Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:

Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

### **Vegetation condition**

The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.

Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.

Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:

Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:

Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.

Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

### **Faunal characteristics**

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

### 3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria above were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, six different classes are described to assess the suitability of the sites to be developed. The different classes are described in the table below:

Table 1: Biodiversity sensitivity ranking

BSR	BSR general floral description	Floral score equating to BSR class
Ideal (5)	Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low. The site is ideal for the proposed development.	29 – 30
Preferred (4)	Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low. The area is preferred for the proposed development.	26 – 28
Acceptable (3)	Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low. The area is acceptable for the proposed development.	21 – 25
Not preferred (2)	The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance. The area is not preferred for the proposed development.	11 – 20
Sensitive (1)	The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high. The area is regarded as sensitive and not suitable for the proposed development.	0 - 10

## **4. ECOLOGICAL OVERVIEW OF THE SITE**

### **4.1 Overview of ecology and vegetation types (Mucina & Rutherford 2006)**

Refer to the list of species encountered on the site in Appendix B.

According to Mucina & Rutherford (2006) the area consists of Vaal-Vet Sandy Grassland (Gh 10). This vegetation type is currently listed as being Endangered (EN) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) and is therefore of high conservation value (Map 2). It is currently subjected to severe pressures primarily as a result of dryland crop cultivation. The site is also listed as occurring on the border of an Ecological Support Area 2 and Critical Biodiversity Area 1 under the Free State Province Biodiversity Management Plan (2015) (Map 3). These would normally have a high conservation value. However, the on-site survey has indicated that the site is in an advanced degraded state and has been transformed to a large degree from the natural condition.

The site consists mostly of indigenous vegetation but with an altered vegetation structure in terms of the natural vegetation type. The site currently consists of a small paddock with approximate size of 1.5 hectares which is being used to keep sheep. This land use has clearly caused significant transformation of the natural vegetation. The vegetation is dominated by a short dwarf karroid shrub layer with a very short grass layer. This can mostly be attributed to grazing by sheep which keeps the grass layer short and encourages the dominance of dwarf shrubs. Trampling also decreases the vegetation cover and grass height. This has almost completely transformed the natural species composition. Another significant impact on the site is the previous shallow excavation of calcrete (Map 1). This was evidently undertaken a long time ago but the topography has nonetheless been permanently transformed here.

The proposed poultry facility will be located on the Farm Tochgeluk 37/0 which is located approximately 13 km to the south west of the town of Brandfort (Map 1). Access to the site is gained by a small dirt road turning off from the R30 tarred road. The site is located adjacent to a farmstead which is considered a transformed area. As described the vegetation structure is dominated by a short, dwarf karroid shrub layer with a short lawn-type grass layer. Exotic weeds are also common.

The topography of the site consists of a flat plain with almost no discernible slope. The elevation on the site varies from 1341 m to 1342 m also indicating that a slope is largely absent. The topography of a portion of the site is no longer intact. An area of approximately 0.34 hectares has been transformed by shallow excavations to extract calcrete material (Map 1). Here the vegetation has also been transformed to a large degree. The site or immediate surroundings do not contain any watercourses or wetlands (Map 2). A poorly defined drainage area is located approximately 270 m to the north of the site and it is therefore considered highly unlikely that the proposed development will have any affect on it and is therefore not included within this assessment.

The underlying geology consists of mudrock and subordinate sandstone of the Adelaide Subgroup in the Beaufort Group of the Karoo Supergroup (Council for Geoscience 2016). The site contains shallow soils underlain by calcrete.

The immediate area has an approximate mean annual rainfall of 550 mm, peaking in late summer. The average annual temperature is 16°C with a high incidence of frost during winter.

As mentioned previously the vegetation structure on the site is dominated by a dwarf karroid shrub layer. Dominant species include *Nolletia ciliaris*, *Lycium horridum*, *Pentzia incana*, *Rosenia humilis*, *Nenax microphylla*, *Amphiglossa triflora*, *Gnidia podocephala*, *Hertia pallens* and *Melolobium candicans*. These may be present as scattered individuals within the natural vegetation type but where they dominate as is the case on the site they are clear indicators of overgrazing, trampling and a degraded vegetation layer. A very short grass layer is also present and dominated by *Chloris virgata*, *Aristida congesta*, *Eragrostis lehmanniana* and *Cynodon dactylon*. All of these are pioneer species establishing in transformed or degraded areas. The layer is also kept very short by continuous grazing pressure. Rare clumps of *Themeda triandra* and *Sporobolus fimbriatus* are considered remnants of the natural vegetation type. Herbs are scattered within the vegetation and include *Berkheya onopordifolia*, *Lotononis listii*, *Salvia verbenaca* and the geophyte *Moraea pallida*. Many of these are also pioneers, establishing in degraded areas. Due to the degraded nature of the site numerous exotic weeds has also established and include *Malva parviflora*, *Argemone ochroleuca*, *Schkuhria pinata*, *Xanthium spinosum* and *Tagetes minuta*. No protected, rare or endangered species could be identified and as a result of the degraded and transformed condition it is also considered highly unlikely that such a species would occur. From the above description of the vegetation on the site it should be clear that it is mostly transformed from the natural condition. Prolonged overgrazing and trampling as a result of the area being used as sheep paddock as well as the portions of shallow excavations are responsible for this transformation.

In view of the site being situated in a Threatened Ecosystem and Critical Biodiversity Area 1 (CBA 1) it may be beneficial to attempt to rehabilitate or restore the site to its natural condition (Map 2 & 3). However, due to the transformation of the topography and the sites proximity to the farmstead this is not considered a feasible alternative.

From the survey of the site and the recorded species composition and vegetation structure the following conclusions can be made about the vegetation on the site. The vegetation type on the site is considered to form part of a Threatened Ecosystem and is also listed as a Critical Biodiversity Area 1 (CBA 1) (Map 2 & 3). This would normally entail an area of high conservation value. However, these mapping resources are compiled at a coarse scale and on-site surveys often indicate that areas have been transformed and no longer has a significant conservation value. The site in question has been utilised as a sheep paddock for a long period and contains portions which has been subjected to calcrete excavations. This has caused extensive degradation of the vegetation and has largely transformed the natural vegetation on the site. The site therefore no longer contains elements which would justify its inclusion in a Threatened Ecosystem or CBA. Rehabilitation of the site to its natural condition would be difficult to attain due to on-site excavations and is considered unfeasible. From the survey of the site it is clearly in a highly degraded condition and does not contain elements of significant conservation value. The proposed development cannot be considered to have a high impact on the site in terms of ecology and vegetation.

#### **4.2 Overview of terrestrial fauna (actual & possible)**

Tracks and signs of mammals are largely absent from the site. Due to the site being utilised as a sheep paddock this will dissuade most mammals from inhabiting the site and it is highly unlikely that any species of conservation significance will occur on the site. However, the site

contains a large colony of Ground Squirrel (*Xerus inauris*). This is generalist species with a widespread distribution and is common throughout. It often inhabits disturbed areas in peri-urban areas. Furthermore, they also prefer areas with a short vegetation layer, as caused on the site by sheep grazing and trampling, as this enables them to see predators over a longer distance. This species cannot be considered to be of significant conservation value. However, it should not be harmed during construction or operation of the proposed facility and will vacate the site once construction commences by their own accord. It is also likely that they will re-establish in the surrounding area.

The proposed development will transform the majority of the vegetation on the site and thus also the available habitat to fauna. However, the extent of the proposed development is small and therefore this impact cannot be considered as high. Furthermore, the natural vegetation on the site is already highly degraded and transformed and the mammal population will also be highly diminished.

It is recommended that any hunting, trapping or capturing be strictly prohibited. As construction activities commence the mammals on the site will vacate the area by their own accord.

List of some Red Data terrestrial mammals that could occur in the region:

South African Hedgehog	<i>Atelerix frontalis</i>
Aardwolf	<i>Proteles cristatus</i>
African Wild Cat	<i>Felis lybica</i>
Small-Spotted Cat	<i>Felis nigripes</i>
Bat-Eared Fox	<i>Otocyon megalotis</i>
Striped Weasel	<i>Poecilogale albinucha</i>

These species are normally rare and do not inhabit areas near human activities and owing to the degraded condition of the site and current land use it is considered highly unlikely that any such species would occur on the site.

## 5. ANTICIPATED IMPACTS

Anticipated impacts that the development will have is primarily concerned with the loss of habitat and species diversity.

Although available mapping sources indicate the site being situated in a Threatened Ecosystem and Critical Biodiversity Area (CBA) (Map 2 & 3) the on-site survey indicated that the natural vegetation is highly degraded and largely transformed from the natural condition. Due to this degradation the available habitat has also been transformed (shallow excavations, transformation of species composition). Coupled with this is also a relatively low species diversity. From the above the site cannot be considered to have a high conservation value and consequently the loss of habitat and species diversity caused by the development is anticipated to remain low.

No protected, rare or endangered species could be identified on the site. Due to the highly degraded condition of the site and the alteration to the natural species composition it is considered highly unlikely that any such species would still remain on the site. This impact is therefore anticipated to be low.

The site or immediate surroundings do not contain any watercourses or wetlands (Map 2). A poorly defined drainage area is located approximately 270 m to the north of the site and it is therefore considered highly unlikely that the proposed development will have any affect on it. The impact on any watercourse or wetland by the proposed development is therefore anticipated to be low.

Disturbance caused by the proposed development may cause susceptible conditions for the establishment of exotic weeds. This is also especially relevant as surrounding natural areas are anticipated to still have a high conservation value. This is therefore the only potentially significant impact that the development may have. This can be easily managed by simply implementing an exotic weed monitoring and eradication programme which can be initiated during construction and incorporated into the management of the facility during operation.

The proposed development will transform the majority of the vegetation on the site and thus also the available habitat to fauna. However, the extent of the proposed development is small and therefore this impact cannot be considered as high. Furthermore, the natural vegetation on the site is already highly degraded and transformed and the mammal population will also be highly diminished. This impact is therefore anticipated to remain low.

The impact significance has been determined and almost all impacts is anticipated to remain low with the exception of the likely establishment of exotic weeds. With adequate mitigation, i.e. weed monitoring and eradication, this can also be decreased to a low impact.

Please refer to Appendix C for the impact methodology.

**Significance of the impact:**

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Before Mitigation</b>								
Loss of vegetation type and clearing of vegetation	2	5	2	3	2	3	2.5	7.5
Loss of protected species	1	5	2	2.6	1	1	1	2.6
Impact on watercourses	1	4	1	2	1	1	1	2
Infestation with weeds and invaders	3	4	2	3	5	3	4	12
Impact on Terrestrial fauna	2	5	2	3	2	2	2	6
<b>After Mitigation</b>								
Loss of vegetation type and clearing of vegetation	2	5	2	3	2	3	2.5	7.5
Loss of protected species	1	5	2	2.6	1	1	1	2.6
Impact on watercourses	1	4	1	2	1	1	1	2
Infestation with weeds and invaders	3	3	1	2.3	3	3	3	6.9
Impact on Terrestrial fauna	2	5	2	3	2	2	2	6

## 6. SITE SPECIFIC RESULTS

### **Habitat diversity and species richness:**

The site does not cover a large footprint. Consequently, the amount of habitats on the site can also not be considered as high. Furthermore, the remaining habitat has been degraded to a large extent. Habitat diversity on the site is therefore considered as relatively low. As a result the species diversity is also relatively low. This is also due to continuous trampling and overgrazing by domestic sheep.

### **Presence of rare and endangered species:**

No protected, rare or endangered species could be identified on the site. Due to the highly degraded condition of the site and the alteration to the natural species composition it is considered highly unlikely that any such species would still remain on the site.

### **Ecological function:**

The ecological function of the site has been altered to a large degree. The site functions as habitat to fauna, sustains a specific vegetation type, i.e. Vaal-Vet Sandy Grassland (Map 2) and forms part of the catchment of adjacent watercourses. The site provides a poor habitat to fauna with trampling and overgrazing decreasing the diversity of mammals able to inhabit the area. Due to the extensive disturbance and transformation of the site it does not support a representative sample of the natural vegetation type with both the species composition and vegetation structure having been altered. Its functioning as forming part of a catchment and providing runoff is also impaired to some degree. Shallow excavations alter the runoff patterns and will decrease the natural runoff. Furthermore, the function of the site is not paramount to the continued functioning of the surrounding natural areas. In other words, development of the site should not impair the functioning of the surrounding area to a large extent. This is also a result of the small extent of the site.

### **Degree of rarity/conservation value:**

According to Mucina & Rutherford (2006) the area consists of Vaal-Vet Sandy Grassland (Gh 10). This vegetation type is currently listed as being Endangered (EN) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) and is therefore of high conservation value (Map 2). The site is also listed as occurring on the border of an Ecological Support Area 2 and Critical Biodiversity Area 1 under the Free State Province Biodiversity Management Plan (2015) (Map 3). These would normally have a high conservation value. However, the on-site survey has indicated that the site is in an advanced degraded state and has been transformed to a large degree from the natural condition. As a result the conservation value of the site can only be considered as moderate.

### **Percentage ground cover:**

The percentage vegetation cover is relatively low. Constant trampling by high concentrations of domestic sheep causes a significant decrease in the percentage vegetation cover.

### **Vegetation structure:**

The vegetation structure on the site is dominated by a short dwarf karroid shrub layer with a very short grass understorey. The natural vegetation should be dominated by a tall grass layer with dwarf karroid shrubs being scattered and rare. The vegetation structure is therefore considered altered to a large degree.



**Infestation with exotic weeds and invader plants:**

The site contains an abundance of several exotic weeds mostly as a result of the disturbance of the area.

**Degree of grazing/browsing impact:**

Grazing by domestic sheep is very high. The area is being used as a sheep paddock and therefore is subjected to constant overgrazing.

**Signs of erosion:**

Signs of erosion is still relatively low although the decrease in vegetation cover causes some sheet erosion.

**Terrestrial animals:**

Tracks and signs of mammals are largely absent from the site. Due to the site being utilised as a sheep paddock this will dissuade most mammals from inhabiting the site and it is highly unlikely that any species of conservation significance will occur on the site. However, the site contains a large colony of Ground Squirrel (*Xerus inauris*). This is generalist species with a widespread distribution and is common throughout. It often inhabits disturbed areas in peri-urban areas. Furthermore, they also prefer areas with a short vegetation layer, as caused on the site by sheep grazing and trampling, as this enables them to see predators over a longer distance. This species cannot be considered to be of significant conservation value. However, it should not be harmed during construction or operation of the proposed facility and will vacate the site once construction commences by their own accord. It is also likely that they will re-establish in the surrounding area.

Table 2: Biodiversity Sensitivity Rating for the proposed poultry facility.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness	3		
Presence of rare and endangered species	3		
Ecological function	3		
Uniqueness/conservation value		2	
Vegetation condition			
Percentage ground cover	3		
Vegetation structure	3		
Infestation with exotic weeds and invader plants or encroachers	3		
Degree of grazing/browsing impact	3		
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species	3		
Sub total	24	4	0
Total		28	

## 7. BIODIVERSITY SENSITIVITY RATING (BSR) INTERPRETATION

Table 3: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Poultry facility	28	Preferred	4

## 8. DISCUSSION AND CONCLUSION

The site proposed for the poultry facility has been rated as being preferred for this development. This is mostly as a result of the highly degraded condition of the site and transformation of the natural vegetation.

According to Mucina & Rutherford (2006) the area consists of Vaal-Vet Sandy Grassland (Gh 10). This vegetation type is currently listed as being Endangered (EN) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) and is therefore of high conservation value (Map 2). It is currently subjected to severe pressures primarily as a result of dryland crop cultivation. The site is also listed as occurring on the border of an Ecological Support Area 2 and Critical Biodiversity Area 1 under the Free State Province Biodiversity Management Plan (2015) (Map 3). These would normally have a high conservation value. However, the on-site survey has indicated that the site is in an advanced degraded state and has been transformed to a large degree from the natural condition. Due to this degradation the available habitat has also been transformed (shallow excavations, transformation of species composition). Coupled with this is also a relatively low species diversity. From the above the site cannot be considered to have a high conservation value and consequently the loss of habitat and species diversity caused by the development is anticipated to remain low.

The site consists mostly of indigenous vegetation but with an altered vegetation structure in terms of the natural vegetation type. The site currently consists of a small paddock with approximate size of 1.5 hectares which is being used to keep sheep. This land use has clearly caused significant transformation of the natural vegetation. The vegetation is dominated by a short dwarf karroid shrub layer with a very short grass layer. This can mostly be attributed to grazing by sheep which keeps the grass layer short and encourages the dominance of dwarf shrubs. Trampling also decreases the vegetation cover and grass height. This has almost completely transformed the natural species composition. Another significant impact on the site is the previous shallow excavation of calcrete (Map 1). This was evidently undertaken a long time ago but the topography has nonetheless been permanently transformed here.

The proposed poultry facility will be located on the Farm Tochgeluk 37/0 which is located approximately 13 km to the south west of the town of Brandfort (Map 1). Access to the site is gained by a small dirt road turning off from the R30 tarred road. The site is located adjacent to a farmstead which is considered a transformed area. As described the vegetation structure is dominated by a short, dwarf karroid shrub layer with a short lawn-type grass layer. Exotic weeds are also common.

The site or immediate surroundings do not contain any watercourses or wetlands (Map 2). A poorly defined drainage area is located approximately 270 m to the north of the site and it is therefore considered highly unlikely that the proposed development will have any affect on it and is therefore not included within this assessment.

Disturbance caused by the proposed development may cause susceptible conditions for the establishment of exotic weeds. This is also especially relevant as surrounding natural areas are anticipated to still have a high conservation value. This is therefore the only potentially significant impact that the development may have. This can be easily managed by simply implementing an exotic weed monitoring and eradication programme which can be initiated during construction and incorporated into the management of the facility during operation.

In view of the site being situated in a Threatened Ecosystem and Critical Biodiversity Area 1 (CBA 1) it may be beneficial to attempt to rehabilitate or restore the site to its natural condition (Map 2 & 3). However, due to the transformation of the topography and the sites proximity to the farmstead this is not considered a feasible alternative.

From the survey of the site and the recorded species composition and vegetation structure the following conclusions can be made about the vegetation on the site. The vegetation type on the site is considered to form part of a Threatened Ecosystem and is also listed as a Critical Biodiversity Area 1 (CBA 1) (Map 2 & 3). This would normally entail an area of high conservation value. However, these mapping resources are compiled at a coarse scale and on-site surveys often indicate that areas have been transformed and no longer has a significant conservation value. The site in question has been utilised as a sheep paddock for a long period and contains portions which has been subjected to calcrete excavations. This has caused extensive degradation of the vegetation and has largely transformed the natural vegetation on the site. The site therefore no longer contains elements which would justify its inclusion in a Threatened Ecosystem or CBA. Rehabilitation of the site to its natural condition would be difficult to attain due to on-site excavations and is considered unfeasible. From the survey of the site it is clearly in a highly degraded condition and does not contain elements of significant conservation value. The proposed development cannot be considered to have a high impact on the site in terms of ecology and vegetation.

The impact significance has been determined and almost all impacts is anticipated to remain low with the exception of the likely establishment of exotic weeds. With adequate mitigation, i.e. weed monitoring and eradication, this can also be decreased to a low impact.

## 9. RECOMMENDATIONS

- The hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the construction phase and operation of the development.
- After construction has ceased all construction materials should be removed from the area.
- Adequate monitoring of weed establishment and their continued eradication must be maintained.
- All construction and operational activities should be confined within the footprint of the site and surrounding natural areas should not be affected by the development.
- The site should be regularly inspected for erosion and this remedied where required. Comprehensive storm water management measures should be implemented to ensure that clean and dirty storm water is kept separate. This is especially relevant where runoff from poultry facilities with high nutrient values may affect the surface runoff or groundwater.
- Monitoring of construction including weed establishment and erosion should take place and should also specifically include any impacts or alterations to the adjacent natural areas.

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## **Annexure A: Maps and Site photos**



## Layout map for the proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort, Free State Province.








Map 1: Layout map of the proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort. The location of the site adjacent to a farmstead is evident. Shallow excavations in calcrete on the site is also visible as the lighter/whitish coloured areas.



### Prepared for:

EKO Environmental  
21 Dromedaris Street  
Dan Pienaar  
9301

### Legend:

-  Approximate site boundary
-  Property boundaries
-  Watercourses
-  Road network
-  Wetlands and impoundments

### Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:3 500

DPR Ecologists

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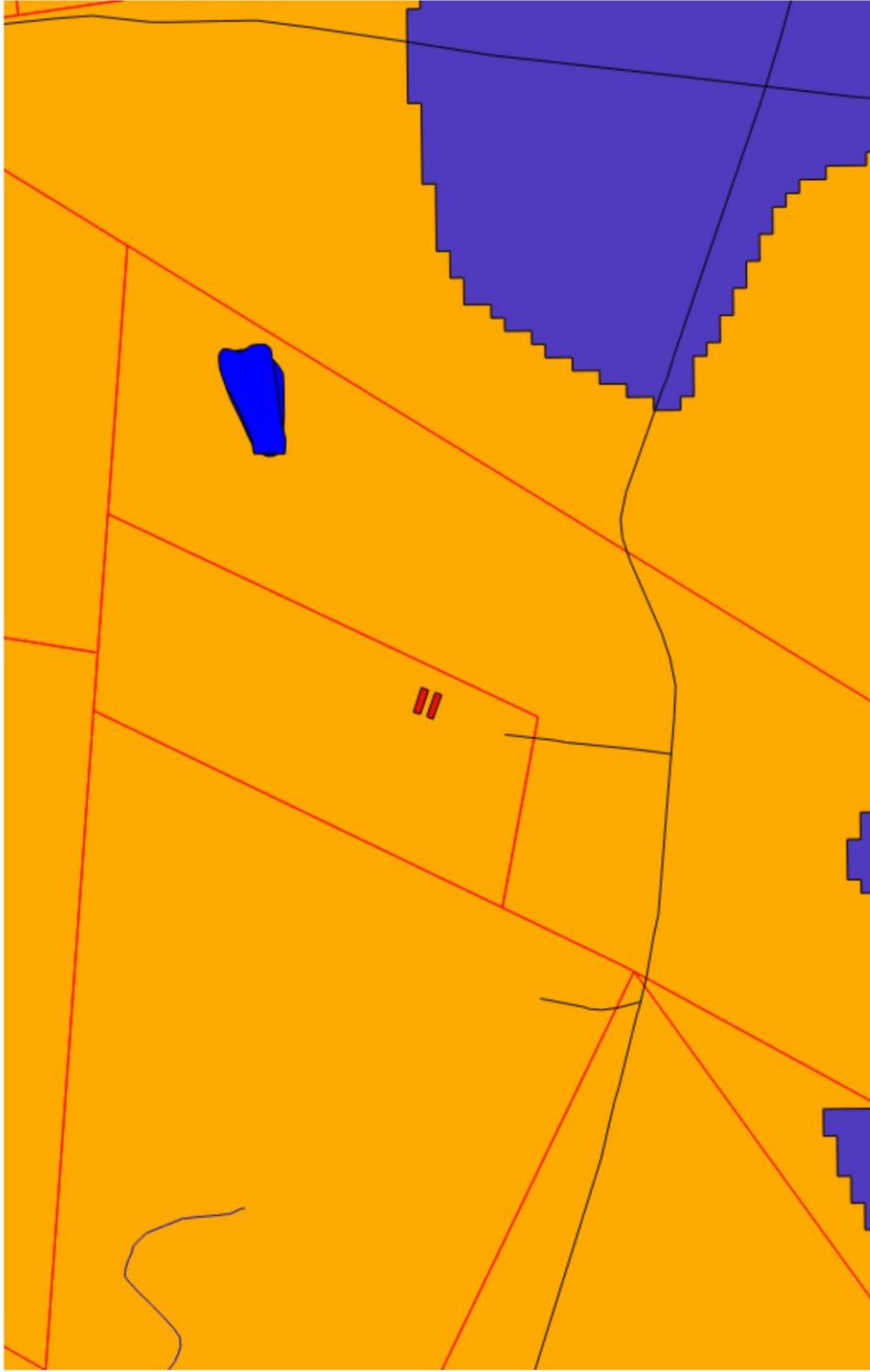
P.O. Box 12726, Brandhof, 9324

Tel: 083 410 0770





**General ecology map for the proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort, Free State Province.**



Map 2: General ecology map of the proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort. Note that this indicates the site is situated in the Vaal-Vat Sandy Grassland, a listed Threatened Ecosystem.



**Prepared for:**  
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9301

**Legend:**

-  Approximate site boundary
-  Property boundaries
-  Watercourses
-  Road network
-  Wetlands and impoundments
-  Threatened Ecosystems
-  Vaal-Vet Sandy Grassland
-  NPAES Focus Areas

**Map Information**

**Spheroid:** WGS 84

Quantum GIS

**Scale:** 1:14 000

DPR Ecologists

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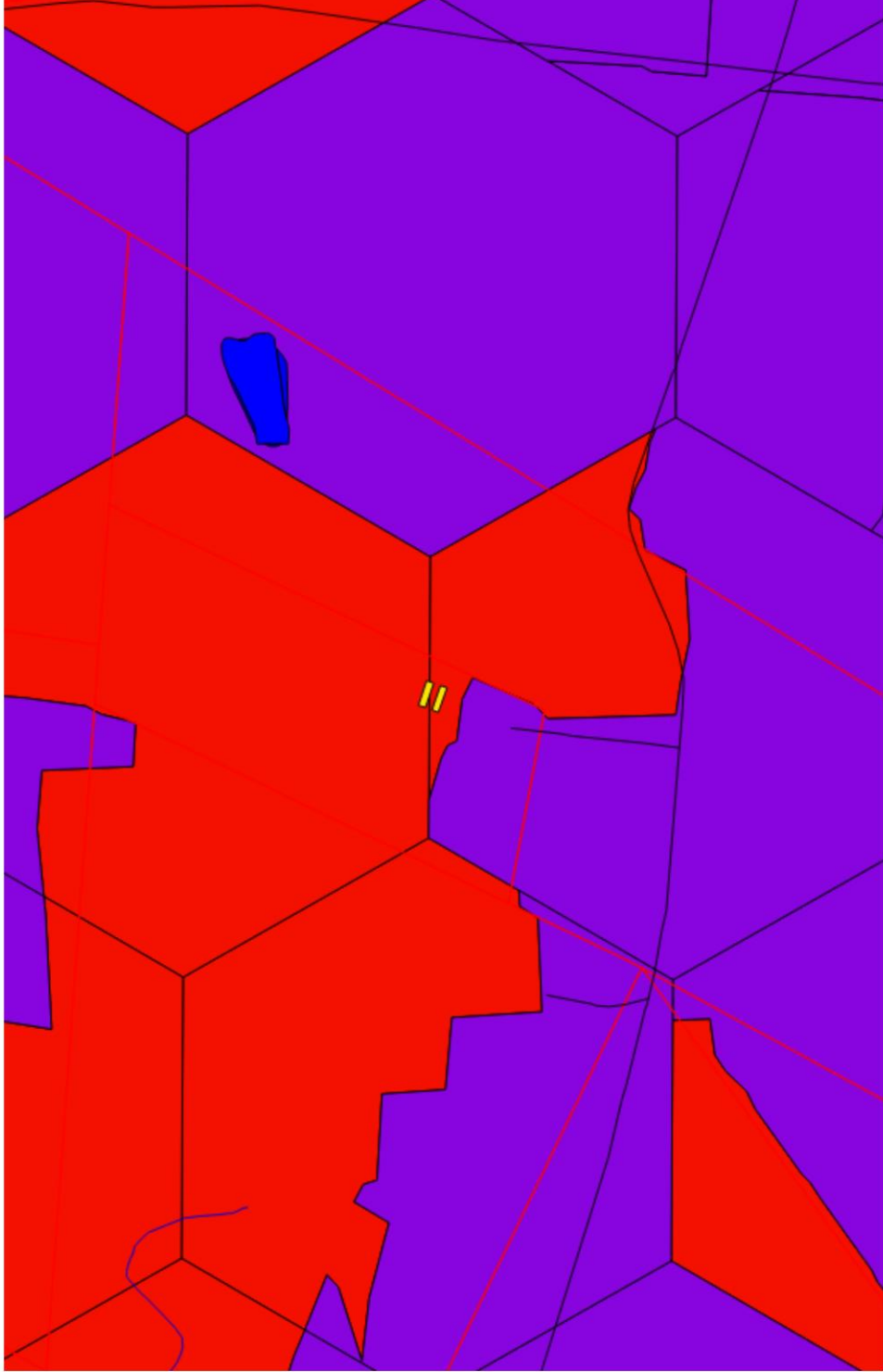
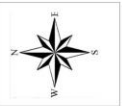
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P.O. Box 12726, Brandhof, 9324

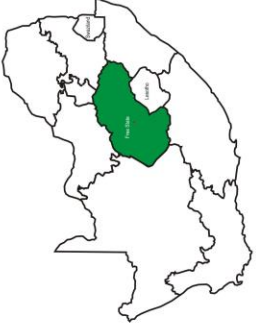
Tel: 083 410 0770



**Free State Biodiversity Plan map for the proposed poultry facility on the Farm  
Tochgeluk 37/0 near Brandfort, Free State Province.**



Map 3: Free State Biodiversity Plan map of the proposed poultry facility on the Farm Tochgeluk 37/0 near Brandfort. The site is clearly situated on the border of a Critical Biodiversity Area 1 (CBA 1).



**Prepared for:**  
EKO Environmental  
21 Dromedaris Street  
Dan Plenaar  
9301

- Legend:**
- ▬ Approximate site boundary
  - ▬ Property boundaries
  - ▬ Watercourses
  - ▬ Road network
- Wetlands and impoundments**
- ▬ Critical Biodiversity Area 1
  - ▬ Critical Biodiversity Area 2
  - ▬ Degraded
  - ▬ Ecological Support Area 1
  - ▬ Ecological Support Area 2
  - ▬ Other
  - ▬ Protected Areas

**Map Information**

**Spheroid:** WGS 84  
Quantum GIS  
**Scale:** 1:14 000

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Figure 1: Panorama of the farmstead with the location of the proposed poultry facility indicated (red).



Figure 2: Panorama of the existing farmstead adjacent to the site.



Figure 3: View of the site itself. Note the low percentage vegetation cover, dominance by dwarf karroid shrubs and the presence of a very low grass layer.





Figure 4: The site is currently being used as a paddock for sheep and this is most likely the cause of transformation of the natural vegetation on the site. Note again dominance of dwarf karroid shrubs.



Figure 5: View of the burrow colony of Ground Squirrel (*Xerus inauris*) on the site.



Figure 6: Another panorama of the site with the farmstead in the background.

## Appendix B: Species list

Species indicated with an \* are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
* <i>Argemone ochroleuca</i>	Herb
* <i>Malva parviflora</i>	Herb
* <i>Schkuhria pinata</i>	Herb
* <i>Tagetes minuta</i>	Herb
* <i>Xanthium spinosum</i>	Herb
<i>Amphiglossa triflora</i>	Dwarf shrub
<i>Aristida congesta</i>	Grass
<i>Berkheya onopordifolia</i>	Herb
<i>Chloris virgata</i>	Grass
<i>Cynodon dactylon</i>	Grass
<i>Eragrostis lehmanniana</i>	Grass
<i>Gnidia podocephala</i>	Dwarf shrub
<i>Hertia pallens</i>	Dwarf shrub
<i>Lotononis listii</i>	Herb
<i>Lycium horridum</i>	Dwarf shrub
<i>Melolobium candicans</i>	Dwarf shrub
<i>Moraea pallida</i>	Geophyte
<i>Nenax microphylla</i>	Dwarf shrub
<i>Nolletia ciliaris</i>	Dwarf shrub
<i>Pentzia incana</i>	Dwarf shrub
<i>Rosenia humilis</i>	Dwarf shrub
<i>Salvia verbenaca</i>	Herb
<i>Sporobolus fimbriatus</i>	Grass
<i>Themeda triandra</i>	Grass

## Appendix C: Impact methodology

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

Environmental Significance = Overall Consequence x Overall Likelihood

### Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: **Severity/Intensity, Duration and Extent/Spatial Scale**. Each factor is assigned a rating of 1 to 5, as described below and in tables 6, 7, 9 and 10.

### Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 7 will be used to obtain an overall rating for severity, taking into consideration the various criteria.

Table 7: Rating of severity

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance



### Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 8: Rating of Duration

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

### Determination of Extent/Spatial Scale

Extent refer to the spatial influence of an impact be local (extending only as far as the activity, or will be limited to the site and its immediate surroundings), regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 9: Rating of Extent / Spatial Scale

Rating	Description
1: Low	Immediate, fully contained area
2: Low-Medium	Surrounding area
3: Medium	Within Business Unit area of responsibility
4: Medium-High	Within Mining Boundary area
5: High	Regional, National, International

### Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 4.

Table 10: Example of calculating Overall Consequence

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

### Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in Table 11 and Table 12.

### Determination of Frequency

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



Table 11: Rating of frequency

Rating	Description
1: Low	Once a year or once/more during operation/LOM
2: Low-Medium	Once/more in 6 Months
3: Medium	Once/more a Month
4: Medium-High	Once/more a Week
5: High	Daily

### Determination of Probability

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

Table 12: Rating of probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

### Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 13: Example of calculating the overall likelihood

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	6
TOTAL LIKELIHOOD (Subtotal divided by 2)	3

### Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH, as shown in the table below.

Table 14: Determination of overall environmental significance

Significance or Risk	Low	Low-Moderate	Moderate	Moderate-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 - 19.9	20 - 25

### Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision making process associated with this event, aspect or impact.

Table 15: Description of the environmental significance and the related action required.

Significance	Low	Low-Moderate	Moderate	Moderate-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. 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.