

# APPENDIX: **F**



## Impact Assessment

**BLOEMFONTEIN OFFICE**

info@ekogroup.co.za

t +27(0)51 444 4700

f +27(0)86 653 5718

Suite 227 Private Bag X01

BRANDHOF 9324

**OFFICES:** Vryheid Kimberley Port Elizabeth



EKO GROUP (PTY) LTD trading as Eko Environmental

Reg no. 2017/311178/07

VAT No. 4020225811

IMPACT ASSESSMENT:

CONSTRUCTION OF CHICKEN LAYER HOUSES ON THE  
REMAINDER OF FARM TOCHGELUK 37, BRANDFORT,  
FREE STATE

October 2018

**Applicant:  
Barry Bekker**

Contact person

Mr Barry Bekker

Postal Address

52 Frikkei van  
Kraayenberg Street  
East End  
Bloemfontein  
9430

Tel:

076 510 8330

**BLOEMFONTEIN OFFICE**

info@ekogroup.co.za

t +27(0)51 444 4700

f +27(0)86 653 5718

Suite 227 Private Bag X01

BRANDHOF 9324

**OFFICES:** Vryheid Kimberley Port Elizabeth



---

EKO GROUP (PTY) LTD trading as Eko Environmental  
Reg no. 2017/311178/07  
VAT No. 4020225811

**Prepared by:**

**PROJECT TEAM**

Environmental Assessment Practitioner(s): Richard Williamson

Johané Theron

Postal address: Suite 227  
Private Bag X01  
Brandhof  
9324

Contact person(s): Richard Williamson

Tel: 051 444 4700

Fax: 086 697 6132

E-mail: richard@ekogroup.co.za

# 1. Assessment methodology

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

Environmental Significance = Overall Consequence x Overall Likelihood.

## 1.1 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 in the tables below.

### 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 1).

**Table 1: 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 2).

**Table 2: 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 3).

**Table 3: 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 4).

**Table 4: Example of calculating Overall Consequence**

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
TOTAL CONSEQUENCE:(Subtotal divided by 4)	Example 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 and in Tables 5 and 6.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken (Table 5).

**Table 5: 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 6).

**Table 6: 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 7).

**Table 7: Example of calculating the overall likelihood**

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	Example 6
TOTAL LIKELIHOOD (Subtotal divided by 2)	Example 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 8).

**Table 8: 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 9).

**Table 9: 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.

## Impact Assessment:

### 1. Geology and soil

The proposed site is predominantly underlain by the argillaceous rocks of the Karoo Supergroup (specifically sandstone, mudstone and shale). Dolerite dykes occur in the vicinity of the site and the surrounding areas (Mucina & Rutherford, 2006).

Primarily covering these rock formations are Aeolian- and Colluvial sand. The soil formations forming from these sands are mostly Avalon, Westleigh and Clovelly formations. The erosion potential of these soils is typically moderate.

It is not expected that the proposed project will have an impact on the geology of the area as the only excavations will include foundations for the proposed chicken layer houses. However, the following impacts may occur on soil as a result of the construction and operational phase of the activity:

- Loss of topsoil during construction,
- A change in soil characteristics as a result of the disturbance of the soil,
- Contamination of soil due to spillage, leakage of sewer pipes and pollution.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	4	5	3	4	4	4	4	16
<b>MITIGATED</b>	2	2	1	1.67	2	4	3	5
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	2	1	3	2	3	2	2.5	5
<b>MITIGATED</b>	1	1	1	1	1	5	3	3
<b>Alternative 2</b> (Solar Power)	2	1	3	2	3	2	2.5	5
<b>MITIGATED</b>	1	1	1	1	1	5	3	3
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	3	3	2	2.7	3	5	4	10.7
<b>MITIGATED</b>	1	1	2	1.33	2	5	3.5	4.7
<b>Alternative 1</b> (Municipal supply).	3	3	2	2.7	3	5	4	10.7
<b>MITIGATED</b>	1	1	2	1.33	2	5	3.5	4.7



It was determined from the impact assessment that the impact without mitigation will be Moderate. There will be a definite loss in topsoil due to the construction of the chicken layer houses. If mitigation measures are implemented and topsoil is stored correctly and not used during construction the impact will be Low - Moderate.

The significance of the impact of the electrical alternatives has been evaluated as the same which is Low – Moderate. The use of groundwater will have a low significance as the applicant already makes use of groundwater and wishes to do the same for this proposed project. The significance of the electrical alternatives will be Low – Moderate before mitigation and Low with mitigation. The significance of the impacts for water supply will be Moderate before mitigation and Low after mitigation.

#### Proposed Mitigation:

- Topsoil will be removed before construction and stockpiled appropriately and in such a manner to prevent any loss thereof. Topsoil will not be used for any construction purposes and will be used at an alternative location where it can be utilised effectively.
- Topsoil will then be used during the rehabilitation and construction of a storm water system for the site.
- Gravel and dolerite to be used during construction will be acquired from a commercial source. In the event that the applicant will mine the material on site a mining permit will have to be obtained before mining.
- Construction equipment will be maintained and drip trays will be used to prevent spillages of petrochemical products which may cause contamination of soil. Any hazardous substances on the site will be stored in a bunded area which consists of an impermeable floor with walls which will have the capacity to contain 110% of the volume of the substance stored therein.

## **2. Climate**

The study area falls within a warm-temperate, summer rainfall climate, where the average temperature (at 15.7 °C) is considered warm, and exceedingly more so in the summer months. Frost occurrences are not uncommon within the winter months and averages at relatively 37 days per annum.

Precipitation as rainfall amounts to an overall mean annual precipitation (MAP) of approximately 530 mm, well within the regions average at 500-600 mm (Bailey & Middleton, 2005). Given the relation between the MAP and the high average temperature, the mean annual evaporation of the A-pan (MAE) for the catchment is also considered high at 2 200-2 600mm (Mucina & Rutherford, 2006).

It is not expected that the proposed establishment of the residential area will have any impact on the climate in the area.

## **3. Land use**

The site is currently vacant with no existing infrastructure. The site was used for housing livestock and the vegetation is degraded.

Potential impacts on the land use of the site:

- The land use and characteristics of the land will change from being an open space to an area containing buildings (i.e. the chicken layer houses and associated infrastructure).

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	3	5	2	3.3	3	5	4	10.7
<b>MITIGATED</b>	2	5	2	3	1	5	3	9
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	2	5	2	3	3	5	4	12
<b>MITIGATED</b>	2	2	1	1.7	2	5	3.5	5.8
<b>Alternative 2</b> (Solar Power)	2	5	2	3	3	5	4	12
<b>MITIGATED</b>	2	2	1	1.7	2	5	3.5	5.8
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	2	5	2	3	3	5	4	12
<b>MITIGATED</b>	2	2	1	1.7	2	5	3.5	5.8
<b>Alternative 1</b> (Municipal Water Supply).	2	5	2	3	3	5	4	12
<b>MITIGATED</b>	2	2	1	1.7	2	5	3.5	5.8

There will be a definite impact on the land use of the site as the land is going to be transformed. It is important to note however, that the proposed site was used for livestock and that the indigenous vegetation has been transformed. The significance of the impacts will be Moderate if no mitigation is implemented. With mitigation the significance of the impact can be Low - Moderate.

It must be mentioned though that the applicant already receives electricity from the municipality and that the infrastructure for municipal supply is already in place. When looking at solar supply there is no existing infrastructure. In addition the applicant already has existing boreholes for water use and wishes to make use of existing groundwater for this proposed project.

Proposed mitigation:

- The area should be kept clean of littering and other pollutants during construction and operation phase to minimise littering on the surrounding environment.
- Buildings should be constructed in a manner in which it is in line with the surrounding environment and should not cause unnecessary obstruction. Buildings, and the site, should also be maintained during operation as to not have a negative aesthetic impact.

#### 4. Plant and Animal life

The site is dominated by scattered- to slightly undulating plains and hills and is mainly covered by low-tussock grasslands with an abundant karroid element. Also found within these plains is the dominance of *Themeda triandra* (Red grass). The occurrence of this vegetation type can be attributed to the erratic rainfall pattern in the area. This rainfall pattern, together with heavy grazing, also increases the occurrence of *Elionurus muticus* (Lemon Grass), *Cymbopogon pospischilii* (Bitter Turpentine Grass) and *Aristida congesta* (Aapstertsteekgras) in the area (Mucina & Rutherford, 2006).

The site is in a degraded condition and the vegetation has been largely transformed due to previous land use activities. The natural vegetation on the site has been transformed to a large degree and is no longer considered a representative example of this vegetation type. The site is not located near any watercourse or other water body.

The site does not contain any wetlands, drainage lines or any other water related systems. The nearest significant watercourse is a small stream which is located approximately 2.27 km south of the site. According to the National Freshwater Ecosystems Priority Areas (NFEPA) there are also no wetlands, rivers or other water bodies near the site.

The site does not form part of an Important Bird Area (IBA) or a Strategic Water Source Area (SWSA). There are also no National Protected Areas Expansion Strategy (NPAES) Focus Areas near the site. The area around the site does not contain any formal or informal protected areas (Van Rensburg, 2018).

Potential impacts on vegetation and animals:

- Transformation of the land,
- Loss of approximately 2ha of partly indigenous vegetation of the Bloemfontein Dry Grassland,
- The growth and spreading of alien plant species,
- Fires made on the site by employees may result in the loss of vegetation of the surrounding environment,
- Destruction of habitat and loss of animal life.

Refer to the Ecological Impact Assessment attached in Appendix D.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	3	5	2	3.3	4	5	4.5	15

<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Alternative 2</b> (Solar Power)	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Alternative 1</b> (Municipal Water Supply).	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7

There will be a definite impact on vegetation and animal life (if any) as the site will be transformed and indigenous vegetation will be removed during the construction phase. However, as indicated by Mr. Van Rensburg in the ecological report the vegetation on the site has been largely transformed as the area has been degraded. Taking into consideration that the vegetation on the site will be removed the significance of the impacts will be Moderate without mitigation and Low-Moderate with the implementation of mitigation measures.

It must be mentioned though that the applicant already receives electricity from the municipality and that the infrastructure for municipal supply is already in place. When looking at solar supply there is no existing infrastructure. In addition the applicant already has existing boreholes for water use and wishes to make use of existing groundwater for this proposed project.

Proposed mitigation:

- No animals will be harmed and/or killed on the site. If any animals are encountered they will be relocated from the site.
- No endangered or protected plant species (if any) will be harmed and/or removed on the site. If any such plants are encountered they will be transplanted from the site to areas which will not be disturbed.
- Vegetation will not be removed from areas where construction will not occur (if any).

- Alien plant species will be removed before seeding to prevent the spread of these plants to the surrounding environment. Alien vegetation should be controlled throughout the lifetime of the project.
- Open fires will not be permitted on the site.

## 5. Surface Water

There are no surface water features located near the proposed development. A neighbouring farmer's dam is located approximately 350 m west of the proposed development and the nearest significant watercourse is a small stream which is located approximately 2.27 km south of the site. It is therefore not anticipated that the proposed project will have a significant impact on surface water features so long as the proposed mitigation measures are implemented and maintained.

Potential impacts which might occur on surface water:

- Storm water may become contaminated because of spillages and mismanagement of petrochemical substances during construction.
- The proposed development may affect the quantity of water draining to the surface water resources due to the buildings and structures acting as obstructions for the flow of water.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	3	3	3	3	4	5	4.5	13.5
<b>MITIGATED</b>	2	2	2	2	2	5	3.5	7
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	3	3	3	3	4	5	4.5	13.5
<b>MITIGATED</b>	2	2	2	2	2	5	3.5	7
<b>Alternative 2</b> (Solar Power)	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7
<b>Alternative 1</b> (Municipal Water Supply).	3	5	2	3.3	4	5	4.5	15
<b>MITIGATED</b>	2	3	1	2	2	5	3.5	7

The proposed site does not contain any steep slopes and the topography is flat. During the construction phase of the proposed project there might be some potential impacts on surface water as drainage of water might be blocked by temporary trenches and/or berms. Furthermore, there will be machinery and vehicles on site which may result in leakages of petrochemical substances which may contaminate storm water.

During the operational phase the infrastructure will be completed and will result in storm water being blocked and not being allowed to drain naturally into the surrounding environment. The significance of the impacts on surface water will be Moderate if no mitigation measures are implemented and Low - Moderate with the implementation of mitigation measures.

It must be mentioned though that the applicant already receives electricity from the municipality and that the infrastructure for municipal supply is already in place. When looking at solar supply there is no existing infrastructure. In addition the applicant already has existing boreholes for water use and wishes to make use of existing groundwater for this proposed project.

There will be a cumulative impact on surface water because of more developments in the area.

Proposed mitigation:

- An adequate storm water management system will be implemented during construction to accommodate runoff during rain events as well as to divert the water around the development to the surrounding drainage basins. Storm water management systems will be maintained, repaired and cleaned regularly to ensure its functionality and to prevent impacts from occurring on downstream surface water resources.
- Once construction is completed, all open natural slopes must be re-vegetated to prevent soil erosion from occurring which might lead to siltation of surface water resources.
- Any hazardous substances permanently stored on site will be stored in a bunded area with a capacity to contain 110% of the volume of the substance. The bunded area will have a controlled outlet from which rain water collected therein can be drained and managed as hazardous waste.
- Spillages of hazardous substances will be cleaned by removing the spill and contaminated soil and disposing of it as hazardous waste.
- The site will be kept clean and tidy to prevent general waste and littering from occurring in the surrounding surface water resources.
- Any incidents on surface water resources during construction will be reported to the relevant authorities within 24 hours of the incident.

## **6. Groundwater**

The Masilonyana Local Municipality is not currently utilizing groundwater as a primary water supply resource for the supply of potable water to Brandfort and surrounding towns. Groundwater is only used by individuals for irrigation of gardens and residential areas as well as small industries and micro irrigation for nurseries and garden centres.

Groundwater may occur in the joints and fractures within the sedimentary rocks of the Karoo Supergroup underlying the site area. Fractured- and jointed zones between these sedimentary rocks and intruding dolerite dykes are considered suitable targets for groundwater abstraction (Bailey & Middleton, 2005).

A large intergranular- and fractured aquifer capable of abstracting borehole yields of 0.5-2.0 l/s is found within the subsurface of the larger extent of the area. Narrow dolerite dykes are also widely considered as suitable targets for obtaining good groundwater strikes. Groundwater quality (measured as electric conductivity) for the groundwater in the catchment was measured at approximately 60 mS/m, and the utilizable groundwater exploitation potential (UGEP) calculated by DWAF (2006) for the same area extent is measured between 4.001-6000 m<sup>3</sup>/km<sup>2</sup>/a (Mucina & Rutherford, 2006).

Potential impacts on groundwater:

- Contamination as a result of spillages of hazardous substances.
- Incorrect storage of waste products on the site may result in the contamination of the groundwater.
- Potential impact on the groundwater quantity as groundwater will be abstracted during and for the development. The applicant must remain within the water abstraction limits as designated in the water use right.
- The development of the chicken layer houses will induce surface runoff and therefore reduce infiltration. Lower infiltration will lead to lower groundwater recharge.
- Deep excavation on the site may extend beyond the water table which will result in an impact on groundwater. However, it is not expected that this impact will occur as the proposed area is not known for very shallow aquifers.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	3	3	3	3	3	5	4	12
<b>MITIGATED</b>	2	1	1	1.3	1	5	3	4
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	No Impact							
<b>MITIGATED</b>								
<b>Alternative 2</b> (Solar Power)	No Impact							
<b>MITIGATED</b>								
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	2	3	2	2.3	2	5	3.5	8.2
<b>MITIGATED</b>	1	2	1	1.3	1	5	3.5	4
<b>Alternative 1</b> (Municipal Water Supply).	2	3	2	2.3	2	5	3.5	8.2

<b>MITIGATED</b>	1	2	1	1.3	1	5	3.5	4
------------------	---	---	---	-----	---	---	-----	---

The potential impacts that might occur will occur as a result of contamination of groundwater from spillages and mismanagement of hydrocarbons and potentially hazardous substances. Due to the volumes of potentially hazardous substances being used on the site it is not expected that there is a risk of serious contamination of groundwater. The proposed project will impact infiltration of water and thus the recharge of groundwater as the concrete structures and infrastructure will result in a greater runoff velocity of surface water from the site and less time for water to seep. The footprint of the project is small though and the impact on infiltration rates is expected to be minimal. The significance of the impacts will be Low - Moderate before mitigation and Low with the implementation of mitigation measures.

It must be mentioned though that the applicant already receives electricity from the municipality and that the infrastructure for municipal supply is already in place. When looking at solar supply there is no existing infrastructure. In addition the applicant already has existing boreholes for water use and wishes to make use of existing groundwater for this proposed project.

It should be noted that the applicant has a water use right for irrigation in terms of the National Water Act of 1998. A part of this water will be used for the chickens.

Proposed mitigation:

- Spillages of any potentially hazardous substances should be cleaned by removing the spill and the contaminated soil and disposing thereof as hazardous waste.
- Potentially hazardous substances will be stored on an impermeable surface inside a bunded area to prevent seepage of the substance and pollution of the groundwater.

**7. Air quality and Noise**

As the study area falls within an agricultural area that is far from large communities and cities, it is relatively free of air pollution and air quality is good. It is possible however, that farming activities upon the site itself can result in a decrease in air quality, albeit to a small degree. It is also possible that the poultry house, located upon the farm, can cause odours and emissions of ammonia, hydrogen sulfide and poultry dust that may contain bacteria and bacterial toxins that can lower the air quality (Whyte, 1993).

Noise levels in the area are also relatively low. Noises are primarily associated with agricultural activities upon the farm and surrounding farms.

During the construction phase there will be an impact on the air quality as a result of dust emissions from clearance of vegetation, construction activities and movement of machinery and vehicle movement on site. The construction activities will also have an impact on the ambient noise in the area.

- The burning of waste product, especially plastic will have an impact on the air quality.
- During the operational phase the impact on dust emissions should be very low.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								



<b>Preferred Alternative</b> (Tochgeluk 37)	3	3	3	3	3	5	4	12
<b>MITIGATED</b>	2	1	1	1.3	1	5	3	4
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	No Impact							
<b>MITIGATED</b>								
<b>Alternative 2</b> (Solar Power)	No Impact							
<b>MITIGATED</b>								
<b>Water supply</b>								
<b>Preferred Alternative</b> (Municipal water supply).	No Impact							
<b>MITIGATED</b>								
<b>Alternative 1</b> (Boreholes).	No Impact							
<b>MITIGATED</b>								

There will be a daily increase in emissions and dust to the atmosphere during construction at the proposed site. There will therefore be an impact on the atmosphere as well as elevated noise levels during construction. There are no other developments or activities in the area responsible for elevated noise levels. The overall impact of the location alternative (Tochgeluk 37) will be Moderate -Low before mitigation. With the relevant mitigation the effect will be Low.

Lastly it must be mentioned that most of the impacts related to air quality and noise will be temporary in nature and is associated with the construction phase. The impacts during the operational phase are minimal apart from the elevated noise levels and emissions associated with chickens.

Proposed mitigation:

- Dust suppression should be implemented on the site to reduce emissions of dust from the site, especially after the clearance of vegetation from the site.
- Construction activities, especially activities contributing to dust emissions should be avoided during windy conditions.
- Construction vehicles and machinery will be equipped with the necessary silencers to reduce noise levels during construction. Vehicles and equipment will also be serviced and maintained to reduce emissions to the atmosphere.
- Vehicles movement and speeds at which vehicles travel on the site will be kept to a minimum.

- Waste will not be burned on site and open fires during construction will not be permitted.
- Construction activities contributing to elevated noise levels will be restricted to normal working hours.

## 8. Archaeological and Cultural Resources

Dr. Lloyd Rossouw indicated that the potential archaeological impact on the site is considered to be non-existent with regard to in-situ Stone Age remains, graves and graveyards or structures of historical significance. It was also indicated that the probability of palaeontological impact on superficial sediments at the proposed site is regarded as improbable as the palaeontologically significant rocks is buffered by a well-developed superficial overburden.

Potential impacts on archaeological and paleontological resources:

- Unearthing and destruction of palaeontological significant artefacts/fossils.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	4	3	3	3.3	3	5	4	13.3
<b>MITIGATED</b>	2	1	1	1.3	1	5	3	4
<b>Electrical facilities &amp; services</b>								
<b>Preferred Alternative</b> (Municipal Electricity, Preferred)	No additional Impact							
<b>MITIGATED</b>								
<b>Alternative 2</b> (Solar Power)	No additional Impact							
<b>MITIGATED</b>								
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	No additional Impact							
<b>MITIGATED</b>								
<b>Alternative 1</b> (Municipal Water Supply).	No additional Impact							
<b>MITIGATED</b>								

The significance of impacts occurring on the preferred location (Tochgeluk 37) will be Moderate - Low without mitigation and Low with mitigation.

Proposed mitigation:

- If any items of archaeological significance be unearthed a heritage specialist will be contacted to investigate and the SAHRA will be notified.

### 9. Visual exposure (Aesthetic impact)

The proposed development is planned outside an urban area and is situated within agricultural lands. The proposed site is currently vacant. The proposed development is located approximately 3km from the nearest primary road (R 30) and will not be visible to road users. Visibility will be restricted to those on the farm itself (Tochgeluk 37) and possible surrounding neighbours.

- The construction phase of the project will have a negative aesthetic impact on the surrounding land users as it will involve construction activities.
- The mismanagement of waste and the improper construction of infrastructure may lead to a negative visual impact on the surrounding land and road users.

Alternatives	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
<b>Site Alternative</b>								
<b>Preferred Alternative</b> (Tochgeluk 37)	2	3	2	2.33	4	5	4.5	10.5
<b>MITIGATED</b>	1	2	1	1.33	2	3	2.5	3.33
<b>Electrical facilities &amp; services</b>								
<b>Alternative 4</b> (Municipal Electricity, Preferred)	2	3	2	2.33	2	3	2.5	5.83
<b>MITIGATED</b>	1	1	2	1.33	1	1	1	1.33
<b>Alternative 5</b> (Solar Power)	2	3	3	2.67	3	4	3.5	9.33
<b>MITIGATED</b>	1	2	1	1.33	1	3	2	2.67
<b>Water supply</b>								
<b>Preferred Alternative</b> (Groundwater).	No Impact							
<b>MITIGATED</b>								
<b>Alternative 1</b> (Municipal Water Supply).	No Impact							
<b>MITIGATED</b>								

The aesthetic impact at the site will be Moderate and can be reduced to a Low impact rating if the correct mitigation and management measures are implemented.

Proposed mitigation:

- Buildings should be monitored throughout the project and maintenance (i.e. painting, fixing trimmings, gardens, etc.) should be done regularly to prevent the site from having a negative aesthetic impact.
- The site should be cleaned of any waste regularly to minimise the negative visual impact.

#### **10. Demographics and Regional socio-economic structure**

The approximate current level of unemployment in Masilonyana local Municipality is 38.8% with youth unemployment being 49.8% (Stats SA 2011). Masilonyana Local municipality, according to Census 2011, has a total population of 63 334. Of this total population, a total of 11 406 people are employed while 2 763 are discouraged work-seekers. This indicates that socio-economic status of Masilonyana is poor and that job opportunities are scarce. Of the 9 661 economic active youth aged 15–34, 4841 are employed and 4820 are unemployed.

Design, construction, operation and recycling initiatives of the development may generate new job opportunities in most job sectors.

The development will have a positive impact on the socio-economics of the area. Direct and indirect jobs will be created during the construction and operation phases. These jobs will include the building of the structures and infrastructure as well as the utilisation of the chickens once operation begins. Indirect jobs include the small businesses in the area which will provide building material to the applicant.

## CONCLUSION AND MOTIVATION FOR PROPOSED ALTERNATIVES

### **The proposed construction and development of chicken layer houses on the farm Tochgeluk 37, Brandfort, Free State**

The development involves the construction of 2 chicken layer houses on farm Tochgeluk 37 which is located between Brandfort and Bloemfontein. The total size of development will not exceed 2 ha. The development will require the installation of services such as electricity and water. The applicant already receives electricity from the local municipality and has a water right to abstract groundwater for irrigation. In this assessment alternatives were identified and assessed. The preferred alternatives were chosen based on certain factors:

- All variables like current property owners, geology, surface and groundwater, air quality, plant & animal life, archaeological and cultural significance and visual exposure were taken into account during the assessment process.
- Lowest clearance of vegetation if possible.
- Proposed development will create job opportunities during the construction period with future jobs becoming available once the project is completed.
- Development will increase chicken egg supply to surrounding towns.
- Development will have a positive contribution towards the socio-economic and economic spheres of Maslilonyana Local Municipality.

The ecological study done by Mr. Darius van Rensburg also indicated that the ecological value of the preferred site is low as the indigenous vegetation is largely transformed and is very degraded.

Based on the above findings the proposed development of chicken layer houses on farm Tochgeluk 37 should be considered.

### **Technological alternatives**

It was determined that the preferred technological alternatives should be implemented based on the following:

#### **Electricity**

Although solar power has a lower carbon footprint, as coal is not utilised to generate the electricity, the capital cost of installing such an energy supply is very expensive on a site of this size. Solar electricity also requires high maintenance which will also be costly. The applicant has limited funds for this project and is already receiving electricity from the local municipality. The implementation of solar power and the maintenance costs associated with it will result in the cost of the project being elevated which could potentially make it unfeasible.

#### **Sewerage**

No sewage is expected to be produced for this project as it involved the construction and operation of chicken layer houses for the production of eggs. During the operation phase the chicken layer houses

will produce large amounts of manure. Such manure is to either be utilised by the farmer or his neighbours or will be sold.

### **Water supply**

An alternative to using groundwater from existing boreholes is for the applicant to connect to the municipal supply. However, this will involve laying down pipes all the way to the farm from the nearest municipal water source, which is several kilometres away. This will be very costly and would make the proposed project unfeasible. In addition the applicant already has a water right for farm Tochgeluk 37 and such water is used for irrigation.

Based on the above findings it is proposed that the preferred alternatives be implemented for the project.

### **Impacts associated with the proposed project as indicated in the Impact Assessment:**

The likelihood of the expected impacts actually occurring will be small and limited if all the recommended mitigation measures are implemented throughout all the phases of the project.

Impacts associated with the Construction Phase will be temporary of nature and local if all mitigation measures are implemented. If the area is properly levelled, storm water is diverted around the site and all potentially hazardous substances are managed appropriately, the likelihood of the potential impacts actually occurring will be low.

In conclusion, if all the recommended measures are implemented, the significance of the impacts expected to be associated with the proposed buildings will be low.

### **Discussion on the 'no-go' alternatives:**

No environmental impact will occur if the no-go alternative is decided on. The opportunity to create employment opportunities and make a positive contribution to the socio-economic situation of the area will be lost.

### **After consideration of the Impact Assessment the following conclusions are drawn:**

#### **Proposed site:**

The vegetation on the site is in a degraded condition and has been largely transformed due to previous activities on the property. Should all the mitigation factors be implemented the environmental impact will be low.

### **The following assessments were done for this proposed development and will be attached in Appendix J:**

1. Floristic and Ecological assessment
2. Phase 1 Heritage Impact Assessment

These assessments provided the means to reaching the following conclusions pertaining to infrastructure for the proposed development on farm Tochgeluk 37, Brandfort, Free State:

The following mitigation measures should be taken into account:

- That the site must be levelled and all vegetation and topsoil removed from the site.
- Receptacles should be placed on site for the collection of general waste during construction and operation. These receptacles should be emptied on a regular basis and waste be disposed of at an authorised landfill site in Bloemfontein or Brandfort.

**eko** ENVIRONMENTAL is a Bloemfontein based company with extended expertise in specific environmental fields but also in the coordination of larger environmental management projects that involve outside contracted expertise for specialist investigations.

We provide our clients with a professional service and cost effective solutions to their environmental problems to conduct their activities, development or explore natural resources like minerals, surface and ground water, without adversely impacting on the environment.

**eko** ENVIRONMENTAL endeavours to provide a high quality service and prompt completion of deliverables.

## services ...

- Biodiversity / Ecological assessments
- Environmental impact assessments
- Environmental management plans
- Water use license applications
- Environmental monitoring
- Waste license applications
- Environmental auditing
  - Mining Authorizations
  - Heritage assessments