

APPENDIX: **F**



Impact Assessment

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EKO GROUP (PTY) LTD trading as Eko Environmental

Reg no. 2017/311178/07

VAT No. 4020225811

IMPACT ASSESSMENT:

CONSTRUCTION OF CHICKEN BROILER HOUSES ON
THE REMAINDER OF FARM FRANSINA 2060,
BOTSHABELO, FREE STATE

November 2018

Applicant:

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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
Site Alternative								
Preferred Alternative (Fransina 2060)	4	5	3	4	4	4	4	16
MITIGATED	2	2	1	1.67	2	4	3	5
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	2	1	3	2	3	2	2.5	5
MITIGATED	1	1	1	1	1	5	3	3
Alternative 2 (Solar Power)	2	1	3	2	3	2	2.5	5
MITIGATED	1	1	1	1	1	5	3	3
Water supply								
Preferred Alternative (Municipal Water Supply).	3	3	2	2.7	3	5	4	10.7
MITIGATED	1	1	2	1.33	2	5	3.5	4.7
Alternative (Groundwater Supply).	3	3	2	2.7	3	5	4	10.7

MITIGATED	1	1	2	1.33	2	5	3.5	4.7
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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. It is important to note that the applicant already farms with chickens on farm Fransina 2060 and wishes to expand his current capacity through the construction of additional chicken broiler houses. The applicant already receives municipal electricity and water for the existing chicken houses and wishes to use the same municipal services for the new proposed chicken houses. The use of groundwater will have a moderate significance as the applicant does not currently use groundwater and will have to drill new boreholes and apply for a Water Use License.

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 on occasion and the vegetation is in good condition.

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
Site Alternative								
Preferred Alternative (Fransina 2060)	3	5	2	3.3	3	5	4	10.7
MITIGATED	2	5	2	3	1	5	3	9
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	2	5	2	3	3	5	4	12
MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Alternative 2 (Solar Power)	2	5	2	3	3	5	4	12
MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Water supply								
Preferred Alternative (Municipal Water Supply).	2	5	2	3	3	5	4	12
MITIGATED	2	2	1	1.7	2	5	3.5	5.8
Alternative 1 (Groundwater Supply).	2	5	2	3	3	5	4	12
MITIGATED	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. 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 is important to note that the applicant already farms with chickens on farm Fransina 2060 and wishes to expand his current capacity through the construction of additional chicken broiler houses. The applicant already receives municipal electricity and water for the existing chicken houses and wishes to use the same municipal services for the new proposed chicken houses. The use of groundwater will have a moderate significance as the applicant does not currently use groundwater and will have to drill new boreholes and apply for a Water Use License. When looking at solar supply there is no existing infrastructure which would make the installation thereof both costly and unnecessary.

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 consists of natural vegetation without any significant alterations to its condition. The vegetation structure on the site is dominated by a grass layer with a significant component of dwarf karroid shrubs and small shrubs present where dolerite outcrops occur (see ecological specialist report in appendix D).

The topography of the site consists of a moderate to gentle slope from west to east. To the east of the outcrops the area slopes toward the west and a small drainage line and stream is located here (Map 1). As long as the poultry facility is located further than 100 meters from these watercourses it is unlikely that the development will affect them. Furthermore, due to the direction of runoff on the site, eastwards, runoff should not be able to enter these watercourses. If the facility should occur closer than 100 meters to these watercourses the need to apply for a Water Use License (WUL) should be determined. In addition, adequate storm water management systems should be implemented and is especially relevant where runoff from the poultry facility with high nutrient values may affect these watercourses.

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 300 m south to south west of the site. Rusfontein dam is approximately 2.2 km north east of the proposed 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 a Critical Biodiversity Area (CBA) in terms of the Free State Province Biodiversity Management Plan (2015) but is located in an Ecological Support Area 1 (ESA 1) which still functions in the support of such areas. The proposed development is however not envisaged to alter the ecological support functioning to a large degree. The habitat and species diversity on the site is considered moderate in terms of this region and does not contain any rare or endangered species. However, a bulb species of significant conservation value, *Gladiolus permeabilis*, forms a small colony along the eastern border (Map 1 in the ecological specialist report seen in appendix D). This colony

should be excluded from the development footprint as far as possible and where this is not possible the necessary permits must be obtained to transplant it to an adjacent area where it will remain unaffected

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
Site Alternative								
Preferred Alternative (Fransina 2060)	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Alternative 2 (Solar Power)	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Water supply								
Preferred Alternative (Municipal Water Supply).	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Alternative 1 (Groundwater Supply).	3	5	2	3.3	4	5	4.5	15
MITIGATED	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 is not endangered in any way. 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 is important to note that the applicant already farms with chickens on farm Fransina 2060 and wishes to expand his current capacity through the construction of additional chicken broiler houses. The applicant already receives municipal electricity and water for the existing chicken houses and wishes to use the same municipal services for the new proposed chicken houses. The use of groundwater will have a moderate significance as the applicant does not currently use groundwater and will have to drill new boreholes and apply for a Water Use License. When looking at solar supply there is no existing infrastructure which would make the installation thereof both costly and unnecessary and result in an even larger loss of indigenous vegetation.

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. Rusfontein dam is located approximately 2.2km north east of the proposed site and there is a minor drainage line approximately 300 m south and south west of the proposed 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
Site Alternative								
Preferred Alternative (Fransina 2060)	3	3	3	3	4	5	4.5	13.5

MITIGATED	2	2	2	2	2	5	3.5	7
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	3	3	3	3	4	5	4.5	13.5
MITIGATED	2	2	2	2	2	5	3.5	7
Alternative 2 (Solar Power)	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Water supply								
Preferred Alternative (Municipal Water Supply).	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7
Alternative 1 (Groundwater Supply).	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7

The proposed site does not contain any steep slopes and the topography is mostly 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 is important to note that the applicant already farms with chickens on farm Fransina 2060 and wishes to expand his current capacity through the construction of additional chicken broiler houses. The applicant already receives municipal electricity and water for the existing chicken houses and wishes to use the same municipal services for the new proposed chicken houses. The use of groundwater will have a moderate significance as the applicant does not currently use groundwater and will have to drill new boreholes and apply for a Water Use License. When looking at solar supply there is no existing infrastructure which would make the installation thereof both costly and unnecessary and result in an even larger loss of indigenous vegetation which can further negatively impact infiltration and run-off rates.

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 MMM is not currently utilizing groundwater as a primary water supply resource for the supply of potable water to Bloemfontein. 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 is only used for agriculture towards the south-western areas (i.e. Bainsvlei & Kalkveld).

The Bloemfontein area is located in a minor aquifer region which is a moderately-yielding aquifer system of variable water quality (DWA, 2013). The proposed activity will connect to the existing water supply line of the municipality and will not use groundwater. The activity will therefore not have any impact on the quantity of groundwater. It is anticipated that if the development will have an impact on the environment, it will be low with the right mitigation measures.

It should be noted that the applicant will not use groundwater during construction or during the operational phase of the activity. In the event that groundwater will be used at any stage of the project a Water Use License should be applied for with DWS and the water use should be authorised by the authority before commencement thereof. 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
Site Alternative								
Preferred Alternative (Fransina 2060)	3	3	3	3	3	5	4	12
MITIGATED	2	1	1	1.3	1	5	3	4
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	No Impact							
MITIGATED								
Alternative 2 (Solar Power)	No Impact							
MITIGATED								
Water supply								
Preferred Alternative (Municipal Water Supply).	2	3	2	2.3	2	5	3.5	8.2
MITIGATED	1	2	1	1.3	1	5	3.5	4
Alternative 1 (Groundwater Supply).	3	5	2	3.3	4	5	4.5	15
MITIGATED	2	3	1	2	2	5	3.5	7

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 Moderate before mitigation and low with the implementation of mitigation measures.

It is important to note that the applicant already farms with chickens on farm Fransina 2060 and wishes to expand his current capacity through the construction of additional chicken broiler houses. The applicant already receives municipal electricity and water for the existing chicken houses and wishes to

Alternative 2 (Solar Power)	No Impact							
MITIGATED								
Water supply								
Preferred Alternative (Municipal water supply).	No Impact							
MITIGATED								
Alternative 1 (Groundwater supply).	No Impact							
MITIGATED								

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 (Fransina 2060) will be Moderate -Low before mitigation. With the relevant mitigation the effects will be Low.

Lastly is 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
Site Alternative								
Preferred Alternative (Fransina 2060)	4	3	3	3.3	3	5	4	13.3
MITIGATED	2	1	1	1.3	1	5	3	4
Electrical facilities & services								
Preferred Alternative (Municipal Electricity, Preferred)	No additional Impact							
MITIGATED								
Alternative 2 (Solar Power)	No additional Impact							
MITIGATED								
Water supply								
Preferred Alternative (Municipal Water Supply).	No additional Impact							
MITIGATED								
Alternative 1 (Groundwater supply).	No additional Impact							
MITIGATED								

The significance of impacts occurring on the preferred location (Fransina 2060) will be Moderate 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 site is located on the Farm Fransina 2060 that is located approximately 2.2km west of Rusfontein Dam which is approximately 5km west of Botshabelo. The farm is accessible from the N8 that connects Bloemfontein with Botshabelo by turning off the N8 towards the south on a gravel road that leads to Rusfontein Dam. Visibility will be restricted to those on the farm itself (Fransina 2060) 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
Site Alternative								
Preferred Alternative (Fransina 2060)	2	3	2	2.33	4	5	4.5	10.5
MITIGATED	1	2	1	1.33	2	3	2.5	3.33
Electrical facilities & services								
Alternative (Municipal Electricity, Preferred)	2	3	2	2.33	2	3	2.5	5.83
MITIGATED	1	1	2	1.33	1	1	1	1.33
Alternative (Solar Power)	2	3	3	2.67	3	4	3.5	9.33
MITIGATED	1	2	1	1.33	1	3	2	2.67
Water supply								
Preferred Alternative (Municipal Water Supply).	No Impact							
MITIGATED								
Alternative (Groundwater Supply).	No Impact							
MITIGATED								

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) 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

According to the reviewed integrated development plan 2016 – 17, about 50 000 people relocated from Botshabelo to Bloemfontein between 2007 to 2011. As a result of this, Bloemfontein now houses almost two thirds of the entire Mangaung Population. During the timeframe of 2001 to 2012, the unemployment rate of Mangaung grew from 69 536 to 73 877 which represents an increase of 6.2% in the unemployment range. During the same timeframe illiteracy and no schooling decreased from 10, 1% in 1996 to 4, 3% in 2011. People with matric have increased from 18, 7% to 30.1% in 2011 (MMM, 2016).

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 phase. These jobs will include the building of the structures and infrastructure. 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 Fransina 2060, Botshabelo, Free State

The development involves the construction of 4 chicken broiler houses on farm Fransina 2060 which is located between Botshabelo 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 and water from the local municipality for the existing chicken houses. 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 supply to surrounding towns. The applicant already has future contractual obligations to fulfil.
- Development will have a positive contribution towards the socio-economic and economic spheres of Mangaung Metropolitan Municipality.

The ecological study done by Mr. Darius van Rensburg also indicated that the ecological value of the preferred site is low.

Based on the above findings the proposed development of chicken layer houses on farm Fransina 2060 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 broiler houses for the production of poultry. During the operation phase the chicken broiler houses will produce manure. Such manure is to either be utilised by the farmer or his neighbours or will be sold.

Water supply

An alternative to using municipal water is for the applicant to make use of groundwater. However, this will require to applicant to apply for a water use license and will require the drilling of boreholes which is costly and damaging to the environment.

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 of low ecological value and no protected or endangered species were identified where the proposed construction will take place. 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 Fransina 2060, Botshabelo, 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.

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- Environmental management plans
- Water use license applications
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 - Mining Authorizations
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