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Report type	Draft Scoping Report		
Project Title	<i>Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province.</i>		
Competent Authority:	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)		
Reference Number:	<u>NWP/EIA/03/2021</u>		
Assigned Officer	Ms. N. Mokotedi		
Project applicant:	Gronum Loots Familie Trust		
Contact person:	Mr Karel Gronum Loots		
Postal address:	Box 128, Groot Marico		
Postal code:	2850	Cell:	083 232 9205
Telephone:	N/A	Fax:	N/A
E-mail:	kgi@gkloots.co.za		
Environmental Assessment Practitioner (EAP):	Mr Jean Pierre (JP) de Villiers of AB Enviro Consult cc		
Contact person:	Mr. JP de Villiers		
Postal address:	7 Louis Leipoldt Street		
Postal code:	2531	Cell:	083 5488 105
Telephone:	071 202 4027	Fax:	018 293 0671
E-mail:	jp@abenviro.co.za		
Professional affiliation(s) (if any)	EAP-EAPASA: 2019/808		
Report compiled by	Mrs JE du Plooy and Mr JP de Villiers EAP-EAPASA: 2019/1573		
Signature	<i>JE du Plooy</i>		
Report reviewed by	Mr. JP de Villiers		
Signature			

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EXECUTIVE SUMMARY

The land owner, Gronum Loots familie trust, has appointed AB Enviro Consult CC, an independent environmental consultancy, to undertake an Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province.

Since 2002, the Applicant has cleared a total area of 136,74 hectares of indigenous vegetation in order to develop arable land and to construct 8 Chicken broiler houses. This process involved the erection of 5 center pivots and the clearance of 6,5 hectares of indigenous vegetation in order to prepare the site for the construction of 8 Chicken Broiler houses.

As Law abiding Citizen, Mr. Loots have always attempted to ensure that he is on the right side of the Law. When he intended to erect his first center pivot back in 2002, he applied to the previously named: "Department of Agriculture" for Authorization. After having received the Authorization, he was under the impression that he can now continue with the activity and he was not aware that he still had to obtain Authorization in terms of Environmental Legislation.

When he wanted to erect his second center pivot in 2011, he followed the same process and once again obtained Authorization from the same Department (then known as: "Department of Agriculture, Forestry and Fisheries".) For the Development of center pivot during 2014, center pivot during 2015 and center pivot during 2018, he once again followed the same process and obtained Authorization from the Department of Agriculture, Forestry and Fisheries.

It was only once he have recently started to investigate the possibility of expanding his operations by applying for Authorization for the erection of three additional Centre Pivots on his neighboring Farm (Which he recently purchased) that he was informed that an application for Environmental Authorization in terms of NEMA is also required. It was only during and after the inspection conducted by the EMI that he became aware of the fact that he have cleared more than 1 hectares of indigenous vegetation without an environmental authorization (as it is required in terms of Section 24 of the *National Environmental Management Act, 1998 (Act No.107 of 1998)* and that he was in contravention of the Law.

This has resulted in the following processes that followed:

- 1) On 08 February 2022 the Environmental Management Inspector (EMI), Mr Seboya Muthuphei conducted a site inspection.
- 2) On 14 February 2022 DEDECT issued a Notice of intention to issue a compliance notice.
- 3) A response letter was submitted to DEDECT on 25 February 2022.
- 4) On 25 February 2022 AB Enviro consult cc was appointed to submit an application for consequences of unlawful commencement of activity in terms of section 24G of NEMA.
- 5) This Application process is ongoing with DEDECT

In order to develop the infrastructure as mentioned in the project title, the Applicant has now appointed AB Enviro Consult to apply for Environmental Authorization.

EIA Process:

- 1) The EAP was contracted by the land owner, **Gronum Loots Familie trust** as their Independent Environmental Assessment Practitioner.
- 2) A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.

- 3) A Fauna and Flora specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
- 4) An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- 5) Desk top studies were conducted and alternatives assessed.
- 6) Site inspections were carried out to verify the outcomes of the desktop studies, and the preferred alternative defined.
- 7) A full Public Participation Process is being followed to obtain inputs from interested and affected parties.
- 8) All the information obtained from the above mentioned processes is being used to assess the Environmental Impact that the proposed development may have on the Environment and vice versa.
- 9) The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP is being used to determine measures to avoid, mitigate and manage potential impacts. These measures are described in the Environmental Management Programme.

Both the proposed development of centre pivots and chicken broilers are in line with national and provincial priorities. The South African commercial poultry industry is the single largest contributor to agricultural related GDP, and an exemplar of the country's commercial livestock sector, with its production systems and efficiency comparable with other global intensive production systems (DAFF, 2018). Section 5 of the North West SDF, Provincial priority area 3 states: "agriculture production need to be expanded, with emphasis on well-supported small-scale farming, communal farmers, commercial farmers and cooperatives. The provincial objectives are:

- 35 734 direct jobs must be created through the agriculture, agro-processing and related sectors by 2030.
- Maintain a positive trade balance for primary and processed agricultural products.
- Agriculture must maintain an average growth rate of 8.5 per cent between now and 2030. Against this growth rate, the Gross Value Added (GVA) contribution of the sector will increase from R 3.39 million to R 17.31 million in 2030 (2010 R-values).
- The sectoral Gross Value Added (GVA) contribution of agriculture will expand from 2.3 per cent in 2010 to 4.1 per cent in 2030 (Actions: Agriculture Development: Expand commercial agriculture)"

In South Africa 6 282 000 people are employed in the agricultural sector, including farm employees and domestic workers. This contributes to over 12% of the South African population employed in the South African agricultural sector. The proposed development will contribute to creating employment in this sector as well as contributes to food security in South Africa.

The activity is listed in terms of the Regulations (in force since 4 December 2014) in terms of Section 24(M) and 44 made under section 24(5) of the National Environmental Management Act (NEMA) 1998 (Act 107 of 1998) as amended and published in Government Notice No. R 326 of 2017. The proposed development triggers the following regulations and listed activities:

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per project description ¹ :	Anticipated years to complete construction (From date of commencement)
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<p>GNR 327, 07 April 2017</p>	<p>5) <i>The development and related operation of facilities or infrastructure for the concentration of—</i> <i>(ii) more than 5 000 poultry per facility situated outside an urban area, excluding chicks younger than 20 days;</i> <i>(iv) more than 25 000 chicks younger than 20 days per facility situated outside an urban area</i></p>	<p>The development and related operation of 8 Chicken Broiler houses for the concentration of— (ii) 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province (Outside of an urban area). (iv) 520 000 broiler chicks younger than 20 days located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province (Outside of an urban area).</p>	<p>10 years</p>
<p>GNR 325, December 2014</p>	<p>15) <i>“The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for</i> <i>(i) the undertaking of a linear activity</i> <i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan”</i></p>	<p>The clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three lands that will be irrigated by means of center pivots) located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province</p>	<p>10 Years</p>

The purpose of the study is therefore to determine the impacts that the environment may have on the proposed activity, as well as the possible impacts that the activity may have on the environment.

The study is being conducted according to normal scientific practices. A theoretical background review was compiled for the different variables by using available information from the literature. Field verification was undertaken and visits paid to the site to gather further information and/or to verify information. It also includes

the identification of *key interest groups*, both governmental and non-governmental, and to establish good lines of communication. Specialist studies were undertaken to determine the impacts on sensitive areas and to determine whether the proposed project can be sustainably implemented. The specialists will also advise on mitigation measures where applicable.

Although this is only the Scoping phase of the proposed development, no “fatal flaws” have been encountered as yet. All the issues envisaged at this stage can be mitigated.

1. INTRODUCTION

The land owner, Gronum Loots familie trust ,has appointed AB Enviro Consult CC, an independent environmental consultancy, to undertake an Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province.

Both the proposed development of centre pivots and chicken broilers are in line with national and provincial priorities. The South African commercial poultry industry is the single largest contributor to agricultural related GDP, and an exemplar of the country's commercial livestock sector, with its production systems and efficiency comparable with other global intensive production systems (DAFF, 2018). Section 5 of the North West SDF, Provincial priority area 3 states: "agriculture production need to be expanded, with emphasis on well-supported small-scale farming, communal farmers, commercial farmers and cooperatives. The provincial objectives are:

- 35 734 direct jobs must be created through the agriculture, agro-processing and related sectors by 2030.
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In South Africa 6 282 000 people are employed in the agricultural sector, including farm employees and domestic workers. This contributes to over 12% of the South African population employed in the South African agricultural sector. The proposed development will contribute to creating employment in this sector as well as contribute to food security in South Africa.

1.1 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The purpose of this document is to adhere to the requirements for compilation of Environmental Impact Assessment Reports as amended and published in Government Notice R.326 of 7 April 2017, Appendix 2, and the National Environmental Management Act (Act 107 of 1998) (NEMA).

1.2 DESCRIPTION OF THE PROCESS FOLLOWED

In order to assess a proposed development it is important to take into consideration the principles of NEMA. These principles are outlined in Chapter 1 and DEDECT as follows:

- 1) *"The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—*
 - a. *shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;*
 - b. *serve as the general framework within which environmental management and implementation plans must be formulated:*

- c. *serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;*
 - d. *serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and*
 - e. *guide the interpretation administration and implementation of this Act, and any other law concerned with the protection or management of the environment.*
- 2) *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
 - 3) *Development must be socially, environmentally and economically sustainable.*
 - 4) (a) *Sustainable development requires the consideration of all relevant factors including the following:*
 - (i) *That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*
 - (ii) *that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*
 - (iii) *that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;*
 - (iv) *that waste is avoided. or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;*
 - (v) *that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;*
 - (vi) *that the development use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;*
 - (vii) *that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and*
 - (viii) *that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.*
 - (b) *Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.*
 - (c) *Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.*
 - (d) *Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.*
 - (e) *Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.*
 - (f) *The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the*

understanding, skills and capacity necessary for achieving equitable and effective participation and participation by vulnerable and disadvantaged persons must be ensured.

- (g) Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.*
- (h) Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.*
- (i) The social, economic and environmental impacts of activities, including disadvantages and benefits must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment.*
- (j) The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.*
- (k) Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.*
- (l) There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.*
- (m) Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.*
- (n) Global and international responsibilities relating to the environment must be discharged in the national interest.*
- (o) The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*
- (p) The costs of remedying pollution, environmental degradation consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.*
- (q) The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.*
- (r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure."*

The above mentioned principals and the applicable legislation, Policies and Guidelines as described in Paragraph 5 of this Report were taken into account in the assessment of the Environmental Impacts for the proposed development. The process followed can be described as follows:

Section 24 G process:

Since 2002, a total area of 136,74 hectares of indigenous vegetation has been cleared in order to develop arable land and to construct 8 Chicken broiler houses. This process involved the erection of 5 center pivots and the clearance of 6,5 hectares of indigenous vegetation in order to prepare the site for the construction of 8 Chicken Broiler houses.

As Law abiding Citizen, Mr. Loots have always attempted to ensure that he is on the right side of the Law. When he intended to erect his first center pivot back in 2002, he applied to the previously named: "Department of Agriculture" for Authorization. After having received the Authorization, he was under the impression that he can now continue with the activity and he was not aware that he still had to obtain Authorization in terms of Environmental Legislation.

When he wanted to erect his second center pivot in 2011, he followed the same process and once again obtained Authorization from the same Department (then known as: "Department of Agriculture, Forestry and Fisheries".)

For the Development of center pivot during 2014, center pivot during 2015 and center pivot during 2018, he once again followed the same process and obtained Authorization from the Department of Agriculture, Forestry and Fisheries.

It was only once he have recently started to investigate the possibility of expanding his operations by applying for Authorization for the erection of two additional Centre Pivots on his neighboring Farm (Which he recently purchased) that he was informed that an application for Environmental Authorization in terms of NEMA is also required. It was only during and after the inspection conducted by the EMI that he became aware of the fact that he have cleared more than 1 hectares of indigenous vegetation without an environmental authorization (as it is required in terms of Section 24 of the *National Environmental Management Act*, 1998 (Act No.107 of 1998) and that he was in contravention of the Law.

This has resulted in the following processes that followed:

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In order to develop the infrastructure as mentioned in the project title, the Applicant has now appointed AB Enviro Consult to apply for Environmental Authorization.

EIA Process:

- 1) The EAP was contracted by the land owner, **Gronum Loots Familie trust** as their Independent Environmental Assessment Practitioner.
- 2) A SAHRA Specialist has been appointed to determine the possible impact of the development on Archaeological and Cultural features.
- 3) A Fauna and Flora specialist has been appointed to determine the impact of the proposed development on the Fauna and Flora of the area.
- 4) An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- 5) Desk top studies were conducted and alternatives assessed.
- 6) Site inspections were carried out to verify the outcomes of the desktop studies, and the preferred alternative defined.
- 7) A full Public Participation Process is being followed to obtain inputs from interested and affected parties.
- 8) All the information obtained from the above mentioned processes is being used to assess the Environmental Impact that the proposed development may have on the Environment and vice versa.

- 9) The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP is being used to determine measures to avoid, mitigate and manage potential impacts. These measures are described in the Environmental Management Programme.

1.3 SCOPING PHASE

The Scoping phase includes the necessary investigations to assess the suitability of the identified site and its surrounding environment, for the development proposal. The scoping exercise describes the “status quo” of the bio-physical, social, economic and cultural environment, and identifies the anticipated environmental aspects associated with the proposed development. Scoping includes the identification of key interest groups, (both government and non-government), and to establish efficient and effective communication. Identifying and informing Interested and affected parties of the proposed development may have an impact on the focus of the EIA. (S. Cliff, 2015)

The purpose of the Scoping Report is to document the outcome of the Scoping Phase of the project. This report fulfils the requirement of the EIA Regulations (2014) for the documentation of the scoping phase. The Scoping Report is compiled in accordance with Section 21(3) of NEMA’s 2014 EIA Regulation (GN R. 982) as amended and published in Government Notice R. 326 of 7 April 2017. Table 1 below provides a summary of the legislative requirements in terms of a Scoping Report as stipulated in Section 21(3) of the EIA Regulations of December 2014 as amended and published in Government Notice R. 326 of 7 April 2017. Cross-references are provided in terms of the relevant section within this Scoping Report where the NEMA and Scoping Report requirements have been addressed.

Table 1: Scoping Report content as per Section 21(3) of NEMA’s 2014 EIA Regulations of December 2014 as amended and published in Government Notice R. 326 of 7 April 2017 Appendix 2

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Scoping Reports	Location in this Scoping report
Appendix 2, section 2 (1)(a)	Details of - (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Paragraph 2
Appendix 2, section 2 (1)(b)	The location of the activity, including – (i) The 21 digit Surveyor General code of each cadastral land parcel; (ii) Where available, the physical address and farm name; (iii) Where the required information in items (i) and (ii) is not available, coordinates of the boundary of the property or properties	Paragraph 4 Paragraph 4 Paragraph 4
Appendix 2, section 2 (1)(c)	A plan which locates the proposed activity or activities applied for, at an appropriate scale, or, if it is – (i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken; or (iii) On land where the property has not been defined, the coordinates	Figure 1 and Figure 2 and 3
Appendix 2, section 2 (1)(d)	A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered; (ii) A description of the activities to be undertaken, including associated structures and infrastructure.	Paragraph 3 Paragraph 3
Appendix 2, section 2 (1)(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Paragraph 5

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Scoping Reports	Location in this Scoping report
Appendix 2, section 2 (1)(f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Paragraph 6
Appendix 2, section 2 (1)(g)	<p>A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-</p> <p>(i) Details of all alternatives considered;</p> <p>(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;</p> <p>(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;</p> <p>(iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(v) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which the impacts-</p> <p>(aa) can be reversed;</p> <p>(bb) may cause irreplaceable loss of resources; and</p> <p>(cc) can be avoided, managed, or mitigated.</p> <p>(vi) The methodology used in deterring and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;</p> <p>(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographic, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(viii) The possible mitigation measures that could be applied and level of residual risk;</p> <p>(ix) The outcome of the site selection matrix;</p> <p>(x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;</p> <p>(xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity.</p>	<p>Paragraph 7</p> <p>Paragraph 10</p> <p>Paragraph 10</p> <p>Paragraph 8</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Paragraph 9</p> <p>Not Applicable</p> <p>Not Applicable</p> <p>Paragraph 11</p>
Appendix 2, section 2 (1)(h)	<p>A plan of study for undertaking the environmental impact assessment process to be undertaken including-</p> <p>(i) A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;</p> <p>(ii) A description of the aspects to be assessed as part of the environmental impact assessment process;</p> <p>(iii) Aspects to be assessed by specialists;</p> <p>(iv) A description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;</p> <p>(v) A description of the proposed method of assessing duration and significance;</p>	<p>Paragraph 12</p> <p>Paragraph 12.1</p> <p>Paragraph 12.2</p> <p>Paragraph 12.3</p> <p>Paragraph 12.4</p>

Section of the EIA Regulations, 2014	Description of EIA Regulations Requirements for Scoping Reports	Location in this Scoping report
	(vi) An indication of the stages at which the competent authority will be consulted; (vii) Particulars of the public participation process that will be conducted during the environmental impact assessment process; (viii) A description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Paragraph 12.5 Paragraph 12.6 Paragraph 12.7 Paragraph 12.8 Paragraph 12.9
Appendix 2, section 2 (1)(i)	An undertaking under oath or affirmation by the EAP in relation to- (i) The correctness of the information provided in the report; (ii) The inclusion of the comments and inputs from stakeholders and interested and affected parties; and (iii) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties.	Paragraph 13 Paragraph 13 Paragraph 13
Appendix 2, section 2 (1)(j)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment.	Paragraph 13
Appendix 2, section 2 (1)(k)	Where applicable, any specific information required by the competent authority.	To be included in final Scoping Report
Appendix 2, section 2 (1)(l)	Any other matter required in terms of section 24(4) (a) and (b) of the Act.	Not Applicable

2. DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

AB Enviro Consult (CC) is a registered consultancy, owned and operated as an independent unit by the registered owner and consultant: **Prof. A.B. de Villiers**

- **Mr J.P. De Villiers** joined the consultancy during 2004 and registered Environmental Assessment Practitioner.
- **Mrs J.E. du Plooy** is a consultant since 2001 and registered Environmental Assessment Practitioner.

ACADEMIC AND PROFESSIONAL QUALIFICATIONS PROF. A.B. DE VILLIERS

Post-Matric Qualifications

YEAR	Qualification	Institution	Field of Study
1968	B.Sc.	PU FOR CHE	Geography, Geology
1970	HONNS. B.Sc.	PU FOR CHE	Soil Science
1974	M.Sc.	PU FOR CHE	Geography
1981	Ph.D.	UOFS	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS Prof. A.B. de Villiers

YEAR	Qualification/ Registration	Institution	Field of Study
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1986	Professional Natural Scientist	S.A. Council for Natural Scientific Professions	Environmental Science
1994	Quality Auditor	ESKOM	Auditing
1998	Personnel & Verifying Auditor	SAATCA	Environmental Auditing

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MR J.P. DE VILLIERS

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1993	BA	PU FOR CHE	Geography, Economics
1994	HED	PU FOR CHE	Geography Economics
2006	B.Sc.(Honns) Cum Laude	North-West University	Environmental Management
2007	M.Sc.	North-West University	Geography

PROFESSIONAL QUALIFICATIONS AND REGISTRATIONS

<u>YEAR</u>	<u>Qualification/ Registration</u>	<u>Institution</u>	<u>Field of Study</u>
2008	Basic Principles of Ecological Rehabilitation and Mine Closure	Centre for Environmental Management (North West University)	Ecological Rehabilitation
2019	Registered as Environmental assessment Practitioner	EAPASA Registration number: 2019/808	

ACADEMIC AND PROFESSIONAL QUALIFICATIONS MRS J.E. DU PLOOY

<u>YEAR</u>	<u>Qualification</u>	<u>Institution</u>	<u>Field of Study</u>
1999	BA	PU FOR CHE	Geography, Tourism
2000	BA (Honns) Cum Laude	PU FOR CHE	Geography
2003	Masters degree in Environmental Management	PU FOR CHE	Environmental Management
2019	Registered as Environmental assessment Practitioner	EAPASA Registration number: 2019/1573	
2001	Aquabase Intro	AQUABASE	Hydrology
2001	Geomedia Professional	INTERTECH	GIS
2001	Map Info	SPATIAL TECHNOLOGY	GIS

EXPERIENCE OF THE CONSULTANCY

Over a period of 26 years (1996-2022) this consultancy has successfully applied for, and obtained positive ROD's and EA's for more than 390 projects. Environmental Control Officer's duties are also performed on various projects.

3. DESCRIPTION OF THE ACTIVITY

The land owner, Gronum Loots Familie Trust, has appointed AB Enviro Consult CC, an independent environmental consultancy, to undertake an Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province.

Arable land

The Marico-Bosveld Dam is a homogeneous earth-fill type dam that is located on the Groot Marico River. The dam was established in 1933 and serves mainly for irrigation purposes. Water used by the Applicant for irrigation purposes is obtained from the irrigation scheme that is managed by the Marico Bosveld GWS. See Photograph below for an illustration of the canal that feeds the dams of the farm for irrigation purposes. The Marico Bosveld GWS has a total scheduled area of 2 523 ha and an allocation of 5 300 m³/ha. The full quota is 13 371 900 m³ with a total of 309 abstraction points.



Canal from which water is obtained for irrigation purposes.

“Centre pivot irrigation refers to the use of a mechanised irrigation system that can help to irrigate crops by maintaining a circular pattern around a central pivot. It largely consists of a lengthy radial pipe that is supported by sprinkling towers. These towers pivot around a centre point of the whole mechanism. The radial pipe itself consists of equally spaced nozzles in order to supply water to the surrounding crops. As the pipe gradually rotates, the water is uniformly released from the nozzles in order to offer nutrition to the crops.



Illustration of a center pivot irrigation system

By using the radial pipe system of centre pivot irrigation, water is made to travel along a straight line down the field. All the nozzles of the pipe have the same flow rate and are made to cover the same area as well. This helps to greatly boost the uniformity of the water being applied to the crops. The design of this system is such that the sprinklers located near the pivot tend to cover a smaller area in comparison to the nozzles located at the end of the pivot. Research has revealed that a pivot system is one of the most efficient methods of irrigating farmlands. It allows farmers to cover numerous acres of land in a relatively small span of time, and it can be used to apply pesticides and fertilizers to the crops with equal efficiency. Additionally, this system only relies on a single piece of machinery to be able to execute on numerous important elements of farming.

The components of the centre pivot irrigation system

Pivot point – A central tower, around which the whole system revolves. It is connected to a fixed water supply. The central tower can be either fixed or movable (on wheels).



Pivot point

Pipeline – A long irrigation line, consisting of a series of lateral pipes. The pipe is supported by the drive towers.



Pipeline

Drive towers – The main pipe, on which the emitters are mounted, is supported over the ground by wheeled towers.



Drive tower

Span – The water pipe between drive towers.

Water emitters – Sprinklers, sprayers or bubblers that are mounted on the pipeline at a spacing that allows for high irrigation uniformity. They may vary in type, size and spacing along the pipeline.



Water emitters

Tower box – Installed on each drive tower and controls its movement.



Tower box and span

Control panel – Located at the pivot point and used as the main operating point. Irrigation prescriptions are fed or uploaded to the control panel. The panel can often be controlled remotely via an app.



Control panel

End gun – An end gun can be added to the machine. It is a large sprinkler that can deliver water to corners of the field that are not covered by the circular irrigation pattern of the pivot.



End gun

The Applicant has already successfully applied with the Department of Agriculture, Forestry and Fisheries for the cultivation of virgin land in terms of Regulation 2 of the control measures pertaining to the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983). Please see approval letter below. The approval deals with the establishment of three fields to be irrigated by means of center pivots. The area approved for the development is for two 20 ha fields and one 10 ha field. Please see layout plan below.

This Application deals with the proposed clearance of indigenous vegetation in order to establish the arable land. The area approved for cultivation is 50 hectares. An additional 15 meters around the arable land has been allowed for in this application to allow for the manoeuvring of farming equipment. Taking cognizance of this, an area of 59,7189 ha of indigenous vegetation will have to be removed. Areas applied for will thus be two 23,6635 hectare circles and one 12,3919 ha circle. (Totalling an area of 59,7189 ha).



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

DIRECTORATE: Land and Soil Management (LSM)
Louis le Grange Building Peter Mokaba Street
P O Box 2557 Potchefstroom, 2520

Enquiries: Vukeya M.M Tel. 018 285 0306 E-mail: MauriceV@dalrdd.gov.za Fax: 018-297 4642
Ref. Nr. 19.7.3.1/NW/Ram

PERMISSION (CL- NW/09/02/2021)

For cultivation of virgin land in terms of Regulation 2 (Act 43 of 1983)

LAND USER : **Gronum Loots Family Trust (Represented by KG Loots)**
ADDRESS : **PO Box 128 Groot Marico 2850**
FARM UNIT : **Riekertsdam 109 JP, Portion 51/62**
DISTRICT : **Marico**
DATE : **23 September 2021**

Area applied for and approved is only 50 hectares as demarcated on the attached map

Your application dated 22 April 2021, pending the administrative documents which were finally submitted to this office in mid-September 2021 refers. Your application to cultivate virgin land in terms of Regulation 2 of the Control Measures pertaining to the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) has been approved.

Permission is hereby granted in terms of the above-mentioned Act to cultivate virgin land on the above-mentioned property on the following **conditions**:

1. To **cultivate only 50 ha of virgin soil** as indicated on the map as provided by you.
2. Control measures should be implemented to protect the land against water and/or wind erosion; you are therefore requested to implement the necessary control measures to **effectively protect the land against excessive soil loss as a result**

of erosion through the action of water and/or wind, as soon as any signs of soil loss are observed.

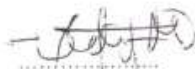
3. Prevent over-irrigation of crops and **manage salinization and waterlogging** in the farm.
4. The **cultivation should be at least 10m from the bank/side of the natural watercourse** draining runoff water from the upper catchment, as prescribed by Regulation 7 of the Act.
5. This **permission is only valid for four years**. Thus a new application needs to be submitted if the land is not cultivated within four years as from the date of this permission.

Also note that this permission **does not exempt you from complying with the requirements of any other legislation** pertaining to this matter. You are strongly advised, to **consult with other relevant authorities, especially with Department of Water and Sanitation to ensure using irrigation water legally**.

Further note that the **conditions of this permission are binding** on you and that non-compliance will constitute a criminal offence for which may result into prosecution. Should anything contained herein be unclear you may contact this office.

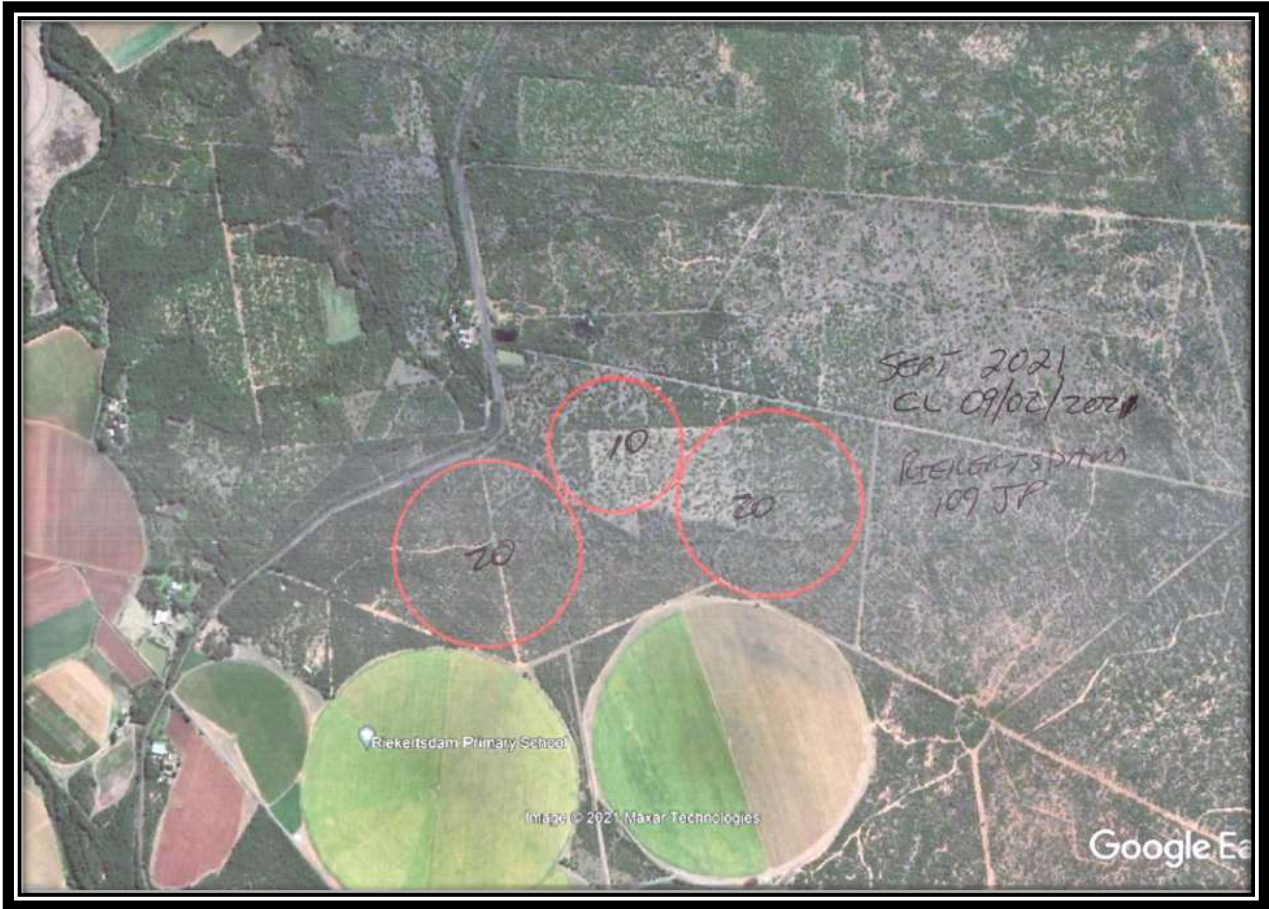
If you have any objections on the above-mentioned conditions you are free to put it in writing within 14 days after receiving the permission to: The Director: Land Use and Soil Management, Private Bag X120, Pretoria 0001. Please provide a copy to this office to ensure a speedy reply to your objection.

Yours truly,



M.M Vukeya

Pp EXECUTIVE OFFICER (Act 43 of 1983)



Map of approved development as it appears in the permit.

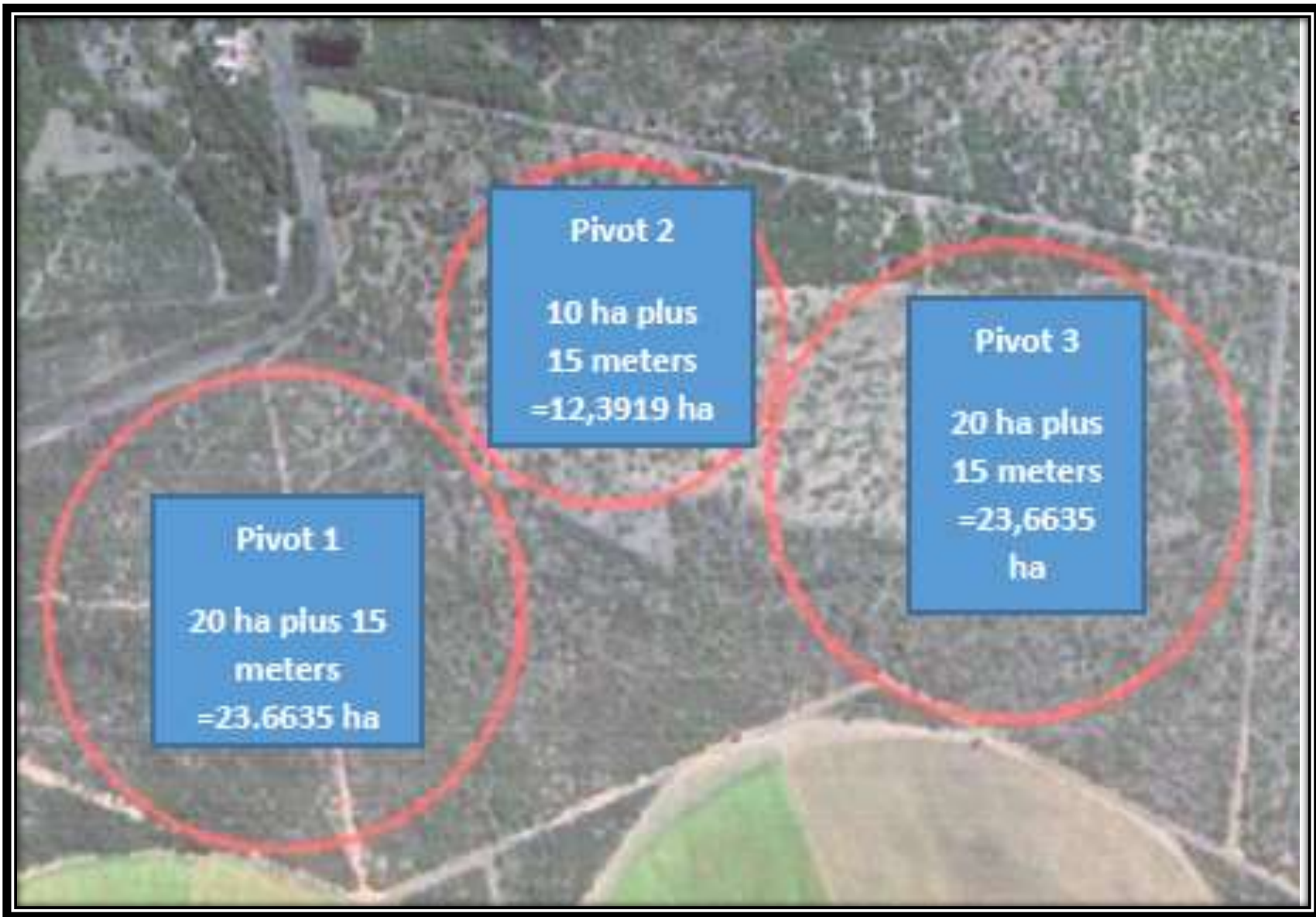


Figure 1. Proposed layout of the three pivot circles.

Map information were analysed and depicted on Google images with the aid of Google Earth Pro (US Dept. of State Geographer, MapLink/ Tele Atlas, Google, 2021)

Chicken Broiler houses

This application also involves the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens. Each of the houses will be able to house 65 000 broilers.

In modern agriculture, it is necessary to optimize and streamline production to deliver the best results continuously. To perform optimally, the birds require their surrounding environment to be perfect. The livestock house climate is one of the most critical factors for the animals' well-being. It puts high demands on the ventilation system, ensuring the correct temperature, air quality, and humidity, regardless of the climate conditions.

The Applicant has opted to install a system developed by SKOV, the inventors of the modern climate control chicken houses. According to their website they want to *"...contribute to an efficient and sustainable global food production that delivers healthy food produced in respect to animal welfare."*

The specific system chosen is known as the LPV system. The LPV system is a classic negative pressure system used for ventilation of poultry production facilities. The system is intended for temperate regions of the world, and it can be adapted to most livestock houses. In an LPV system, the wall, ceiling, or roof inlets supply fresh air. During cold periods, fresh air is mixed with the housing air before reaching the area occupied by the birds. During warm periods, the air enters the same way but is sucked into the livestock house at a higher speed. It results in air circulation around the birds, and they are cooled without perceiving the increased air circulation as a draught. The system automatically adapts ventilation based on the outside temperature, production type, and age of the animals. The exhaust units are adjusted according to the Dynamic Multistep principle, which substantially reduces power consumption.

Benefits:

- Uniform climate all year round for the birds
- Low energy and heating consumption
- Low running costs, efficient chimneys, fans, and control principles
- Emergency opening system for maximum security
- Easy to install and low maintenance costs

Delivering the best results demands the ability to monitor production continuously and take corrective actions if it takes an unanticipated course. SKOV's production controllers have production modules adapted to broilers, breeders, and layers with functions that enable systematic monitoring and effective control of production. Common to these production modules is that they can monitor the birds' daily gain, feed intake, feed conversion ratio (FCR), water and feed consumption ratio, and mortality.

A SKOV controller controls the climate and production at house level. FarmOnline shows photos and drawings of the farm, providing a high level of graphic recognisability and quick navigation. The program displays selected key values for temperature, humidity, ventilation, cooling, and heating through user-friendly graphic elements, and you can change settings directly. All essential production data is displayed on one screen – providing a quick overview and enabling in-depth analyses. As both current and historical data is displayed for mortality, weight, and feed consumption, it is possible to monitor the development of the individual batches and compare them to each other. Owing to FarmOnline live connection to all controllers, the farm manager can respond to alarms immediately by, for example, changing the setup in the controller via FarmOnline. Alarms can be sent as text messages or emails or displayed on a smartphone via the FarmOnline app. Therefore, the farm manager can intervene immediately in a qualified way to safeguard the welfare of his birds and his production.

Please see Figure 2 for the proposed Layout plan for the Chicken Broiler Houses and Figure 3 for a copy of the layout and design of the houses as designed by SKOV.

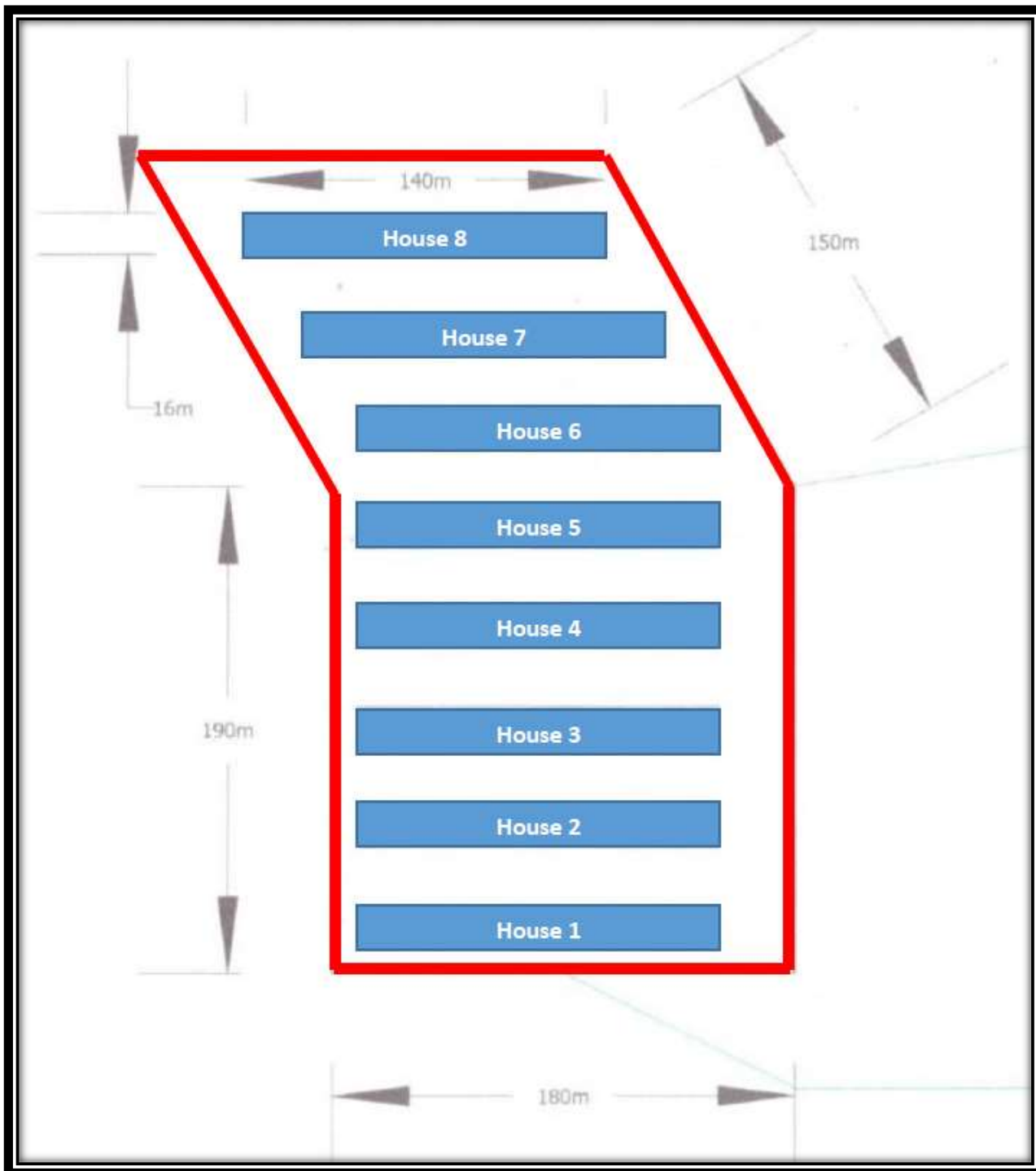


Figure 2: Proposed Layout plan for the eight Chicken Broiler Houses.

Broiler house 180 x 16.5 m with Chimney fans & 50" Box fans

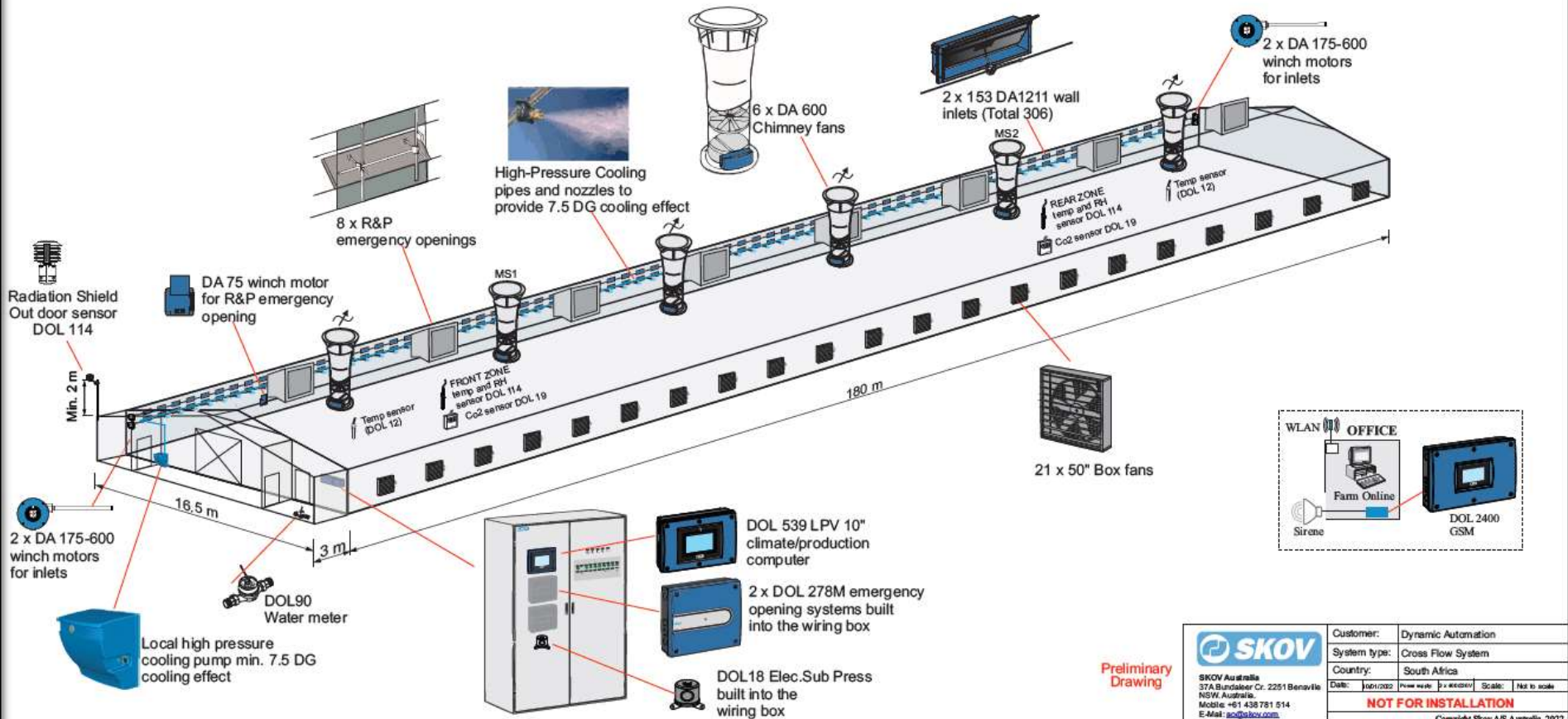
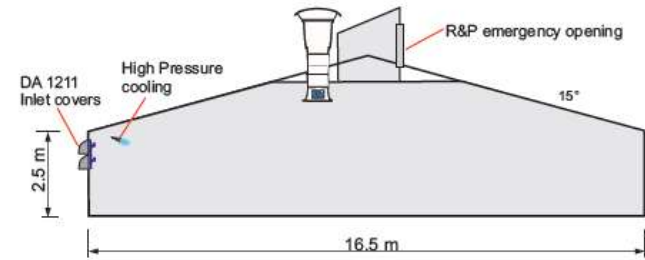
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Animals :

- 65,000 broilers 1.7 kg.
- 3.8 m³/bird/h in nom
- 7.6 m³/kg bird/h in full ventilation.

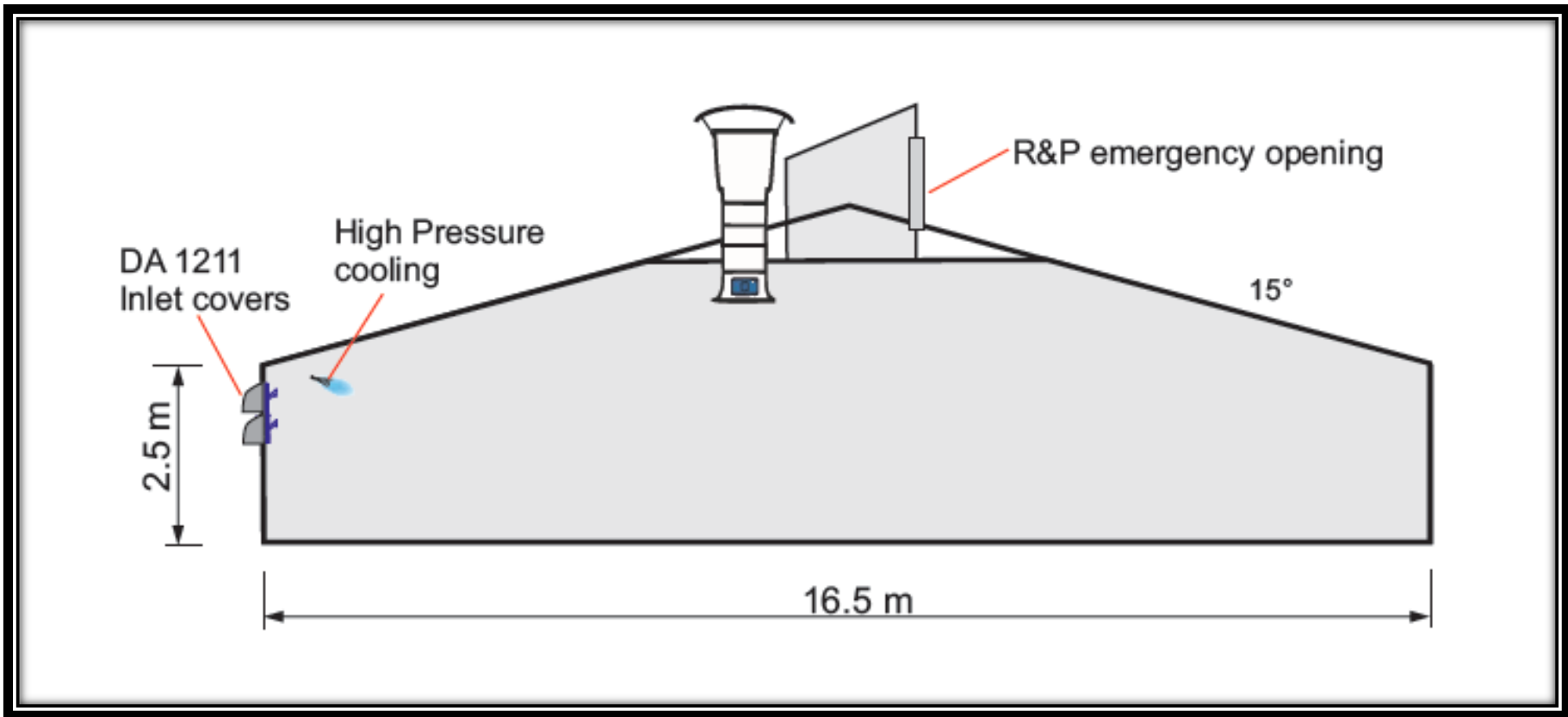
Side Mode :

- 306 x DA1211 wall inlets (1,150 m³/h @ 10 PA each).
- 6 x DA 600 chimney fans (12,500 m³/h @ 25 PA).
- 21 x 50" Box fans 1.5HP (37,400 m³/h @ 25 PA).
- 8 x R&P emergency openings

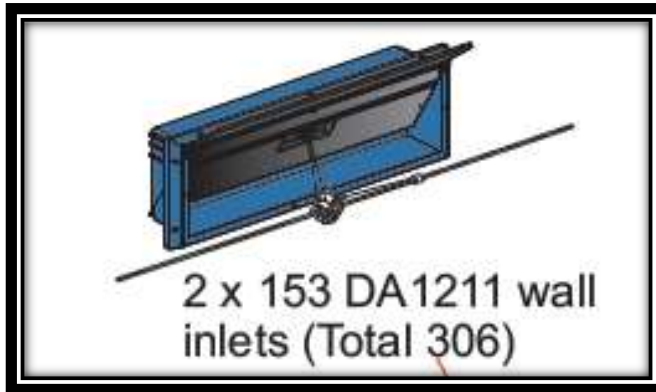


<p>SKOV Australia 37A Bundaleer Cr. 2251 Benaville NSW, Australia Mobile: +61 438 781 514 E-Mail: info@skov.com</p>	Customer:	Dynamic Automation
	System type:	Cross Flow System
	Country:	South Africa
	Date:	10/01/2022
NOT FOR INSTALLATION		
Copyright Skov A/S Australia, 2022		

Figure 3: Individual layout and design of the houses.



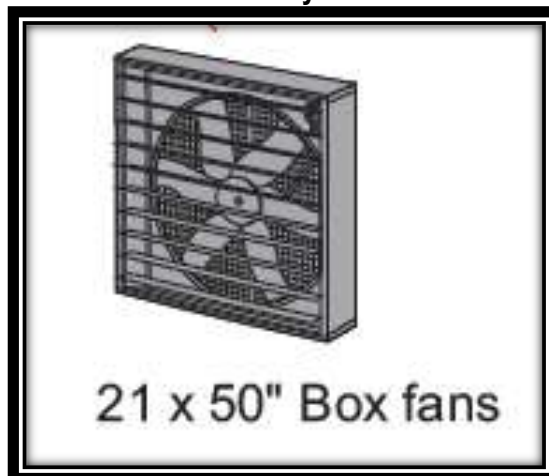
Dimensions of the Chicken broiler houses.



Wall inlet



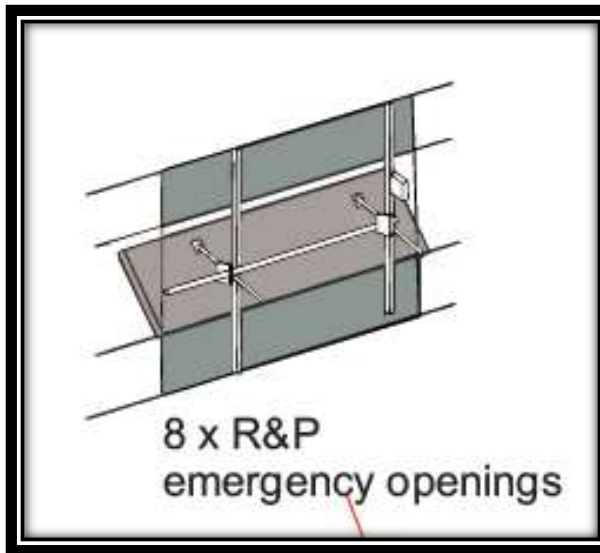
Chimney fan



Box fan

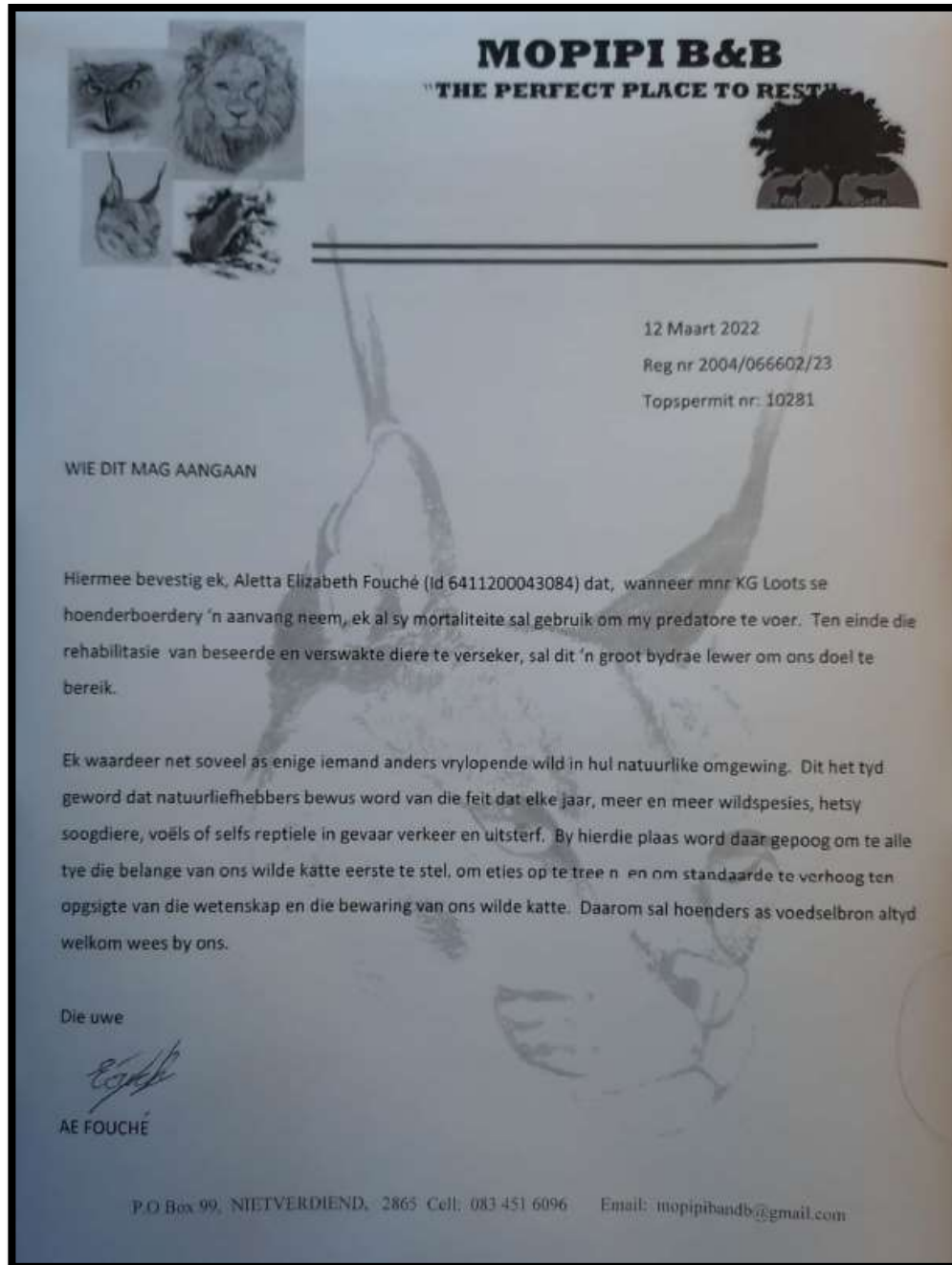


High-pressure cooling nozzle



Emergency openings

Water will be supplied from existing boreholes. Electricity will be supplied from existing Eskom power supply on the farm. Manure will be collected by hand and be used as fodder on the crops. Wash water will be diverted into a sedimentation pond that will be located at the lowest elevation of the site to allow wash water to drain towards it. The neighbouring predator farm (Mopipi B&B) has confirmed that they will gladly accept all chicken carcasses from the applicant in order to feed their predators (See letter below).



Letter confirming chicken carcasses will be used to feed predators on the neighbouring farm

4. DESCRIPTION OF THE PROPERTY

The proposed development is located on Portion 62 of the Farm Riekersdam 109 JP, within the jurisdiction of the Ramotshere Moiloa Local Municipality and the Ngaka Modiri Molema District Municipality within the North West Province. Please see Figure 1a and b for Locality Maps. The site is located approximately 16km north of the Town of Groot Marico and 3 km north of the Marico-Bosveld Dam and the Marico-Bosveld Nature Reserve. The topography of the study area is relatively flat and open, with little or no rocky ridges or outcrops present. Vegetation at site consists of a savanna that ranges from slightly degraded to a fair condition (See Photo 1). In some areas localised bush encroachment of the tree *Senegalia*

mellifera and the shrub *Asparagus lariginus*, is present. The tree species *Vachellia tortilis* (Photo 2) and the shrub *Grewia flava* are conspicuously abundant at the site. Other indigenous tree species include *Searsia lancea*, *Gymnosporia buxifolia*, *Dichrostachys cinerea*, *Peltophorum africanum* and *Senegalia burkei*. *Combretum hereroense* and *Olea europaea* subsp. *africana* are present in some areas. Herbaceous plant species include *Hibiscus trionum*, *Chamaecrista mimosoides* and *Solanum panduriforme*. Graminoids such as *Aristida congesta*, *Eragrostis lehmanniana*, *Heteropogon contortus*, *Setaria sphacelata*, *Cynodon dactylon* and *Urochloa mosambicensis* are visible at the site. Wetlands and rocky ridges appear to be absent at the site.



Photo 1 View of part of the eastern section of the site.
Photo: R.F. Terblanche.



Photo 2 View of savanna of the site where the tree *Vachellia tortilis* (Umbrella Thorn) is conspicuous.
Photo: R.F. Terblanche.

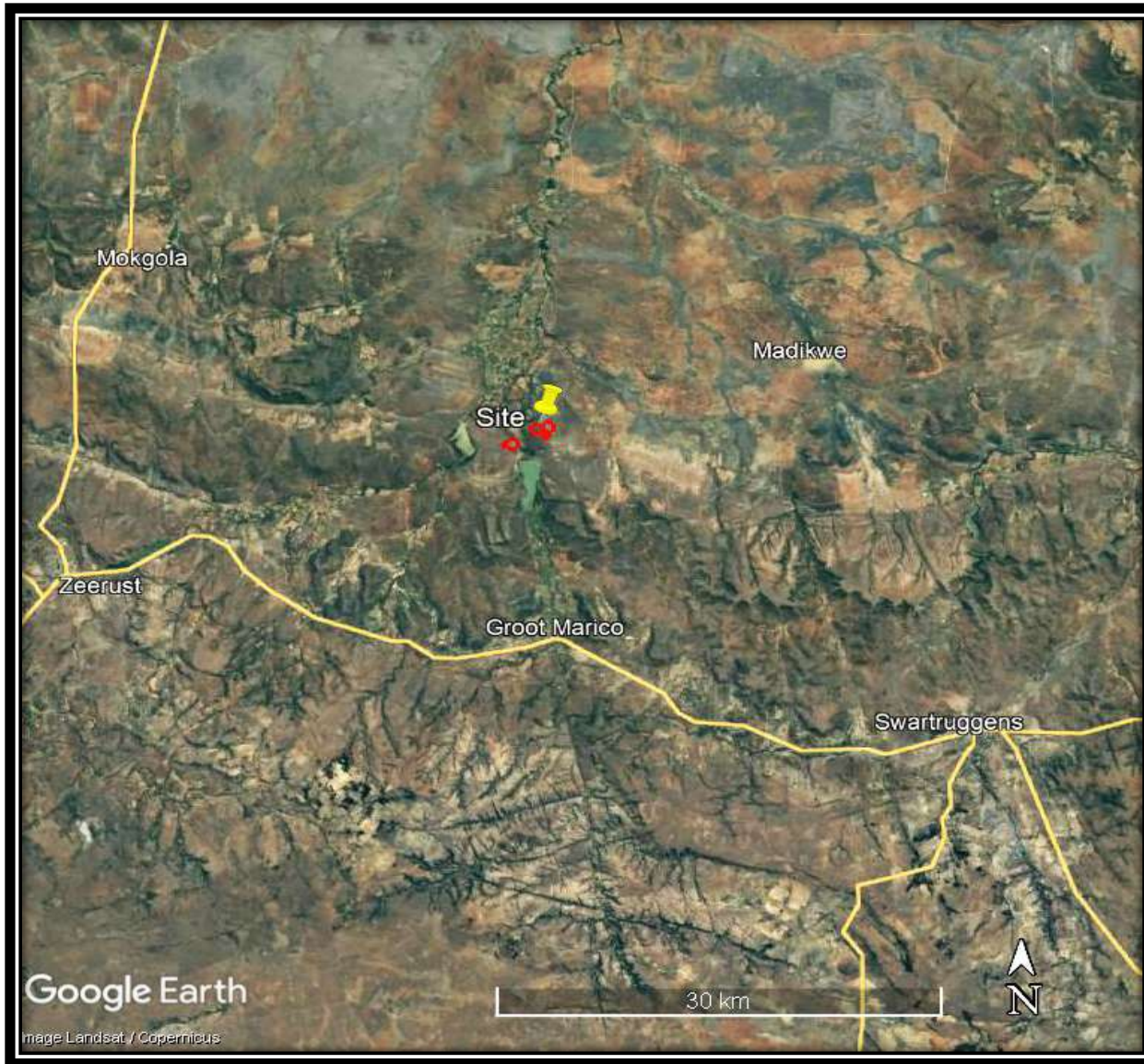


Figure 4a: Locality Map

Map information were analysed and depicted on Google images with the aid of Google Earth Pro (US Dept. of State Geographer, MapLink/ Tele Atlas, Google, 2021)

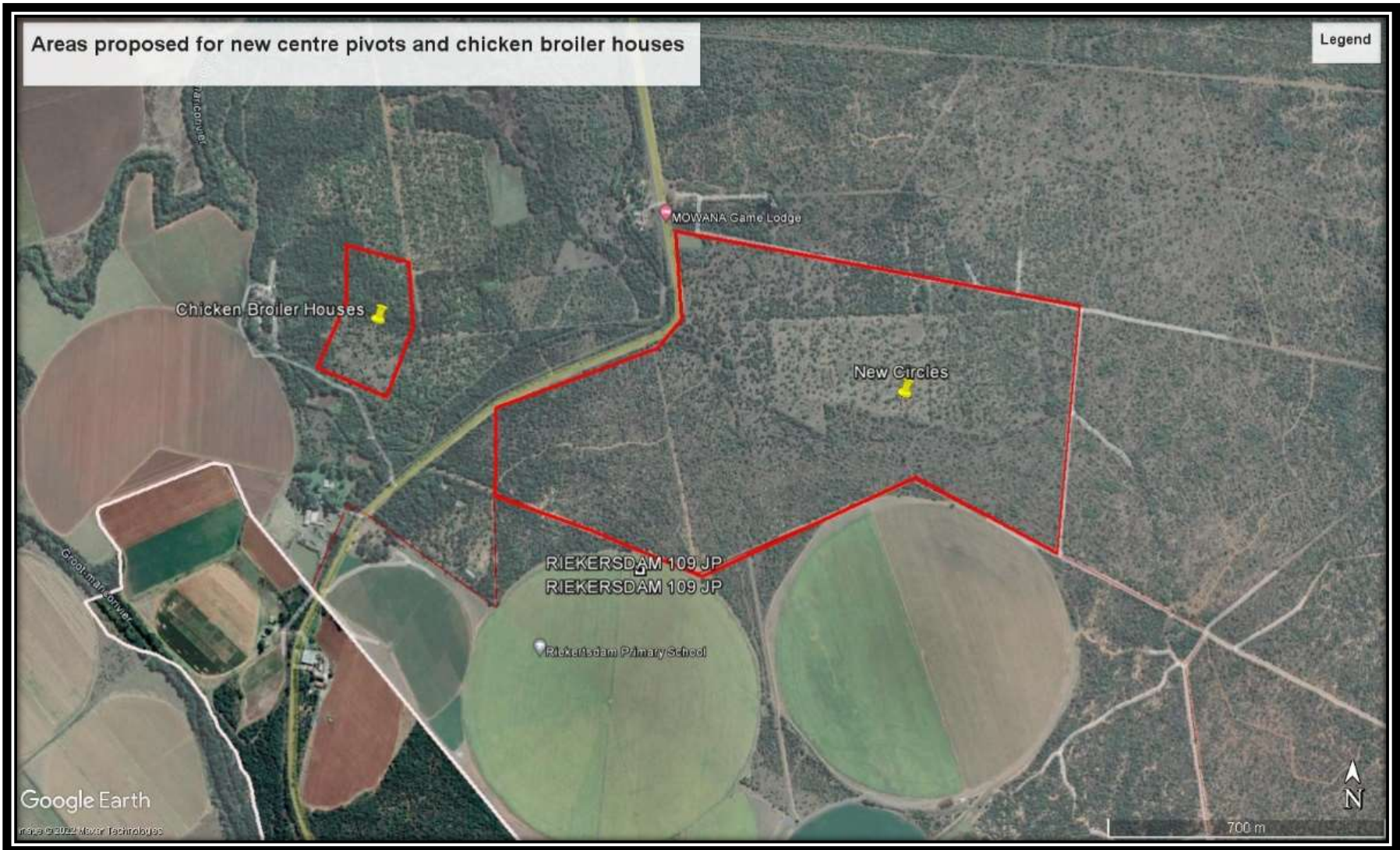


Figure 4b: Locality Map (Indication of the location of the western and eastern section at the site)
 Map information were analysed and depicted on Google images with the aid of Google Earth Pro (US Dept. of State Geographer, MapLink/ Tele Atlas, Google, 2021)

In relation to the area on which the chicken broilers are to be established, an area of 6.5ha of indigenous vegetation has already been cleared to establish the houses (this is subject of a separate S24G application which is current with DEDECT).



Photo 3: Vegetation cleared in order to erect Chicken Broiler Houses.

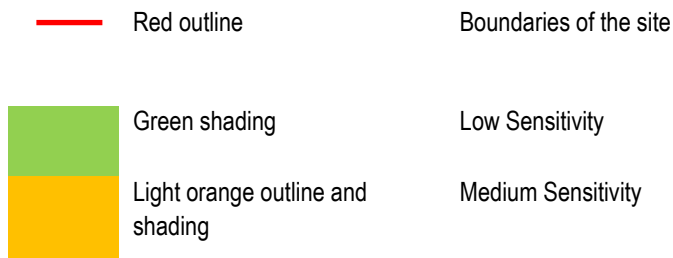


Photo 4: Vegetation cleared in order to erect Chicken Broiler Houses.

Site sensitivity has been determined by the appointed Ecologist who has generated the following sensitivity maps. (See Figure 5 and 6). From this it is clear that the areas cleared for the erection of the Centre Pivots can be classified as having a medium sensitivity and most of the area cleared for the construction of the Chicken Broiler Houses can be considered as Low (As this site has been cultivated in the recent past). The remainder of this area is considered to be medium. Please also see Figure 7 for a copy of the sensitivity Map that was generated using the 2015 North West Biodiversity database as it appears on the SANBI website. According to this map, the site is located in an Aquatic Ecological Support area 2 (ESA 2).



Figure 6: Indications of ecological sensitivity at the area for the construction of the chicken broiler houses.



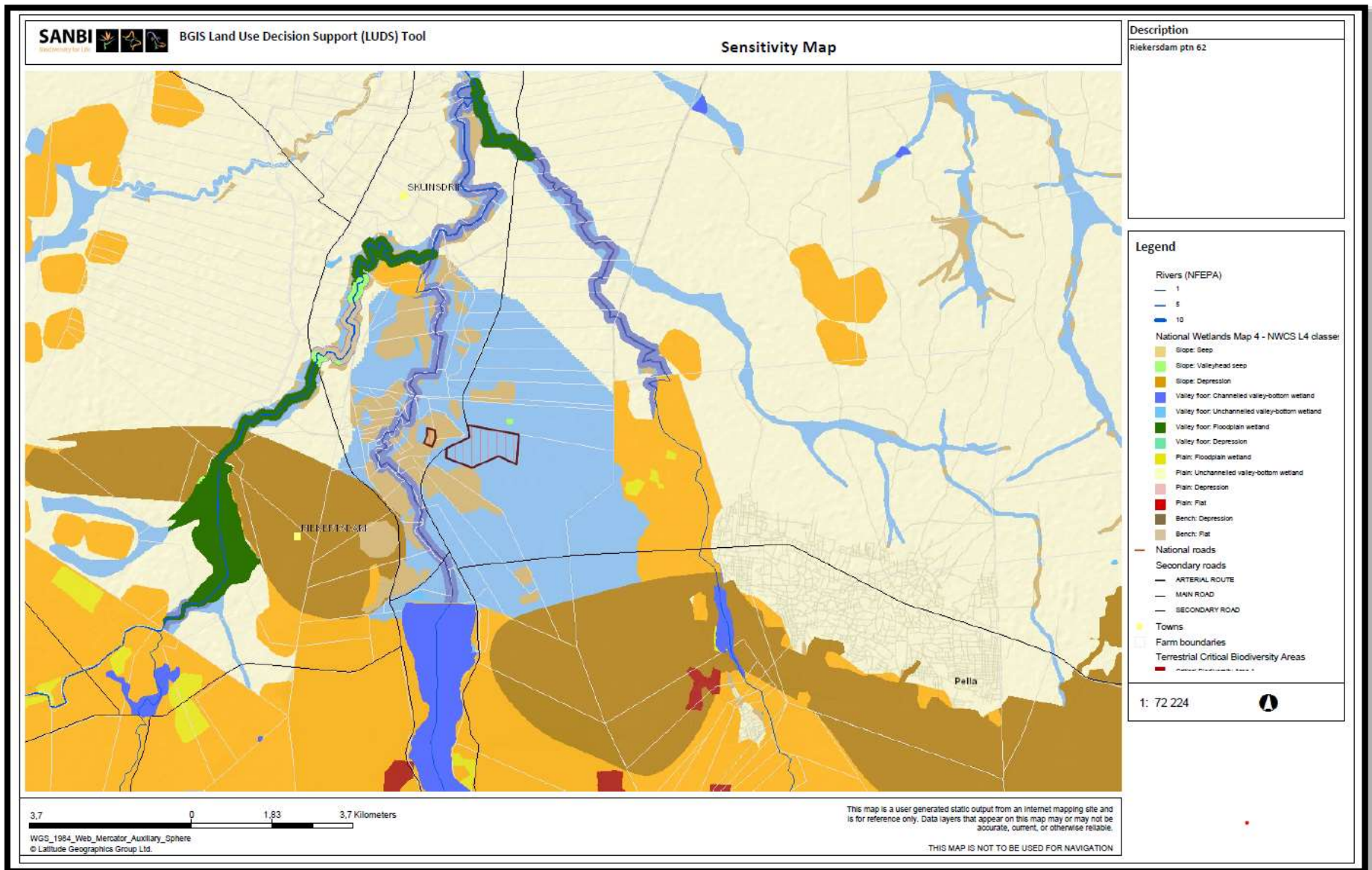


FIGURE 7: SENSITIVITY MAP

Source: 2015 North West Biodiversity database as it appears on the SANBI website

Landowner:	Gronum Loots Familie Trust		
Contact person:	Mr Karel Gronum Loots		
Postal address:	Box 128, Groot Marico		
Postal code:	2850	Cell:	083 232 9205
Telephone:	N/A	Fax:	N/A
E-mail:	kgl@gkloots.co.za		

Local authority in whose jurisdiction the proposed activity will fall:	Ramotshere Moiloa Local Municipality		
Municipal Ward No:	19: COUNCILLOR JOHANNES-KENOSI MOKGATLE		
Nearest town or districts:	Groot Marico		
Contact person:	Mr Mangope (Acting)		
Postal address:	PO Box 92, Zeerust,		
Postal code:	2865	Cell:	N/A
Telephone:	018 642 1081	Fax:	018 642 1175 / 018 642 2618
E-mail:	communications@ramotshere.gov.za		

Site Co-ordinates	Latitude (S):			Longitude (E):		
The co-ordinates should be in degrees, minutes and seconds using the Hartebeeshoek94 WGS84 co-ordinate system.						
Centre Pivot 1	25°	26'	30.95"	26°	23'	49.40"
Centre Pivot 2	25°	26'	21.42"	26°	23'	57.96"
Centre Pivot 3	25°	26'	25.42"	26°	24'	15.87"
Chicken Broiler houses	25°	26'	21.53"	26°	23'	22.01"

5. LEGAL AND OTHER REQUIREMENTS

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management Act No. 107 of 1998 as amended.	NEMA is the guiding legislation that has been considered during the Environmental Impact Assessment process and the compilation of this Scoping Report.	National & Provincial (DEA And DEDECT)	27 November 1998
The Bill of Rights, Constitution of South Africa, Section 27 (1)(b)	<p>The Constitution of the Republic of South Africa is the legal source of all law, including environmental law, in South Africa. The Bill of Rights is fundamental to the Constitution of South Africa and in, section 24 of the Act, it is stated that:</p> <p>Everyone has the right (a) to an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p> <p>Given that environmental management is founded partly on the principles of public participation, Section 195 of the Constitution is of primary relevance:</p> <p>(1) Public administration must be governed by the democratic values and principles enshrined in the constitution, including the following principles: (a) (b) (c) (d) (e) Peoples needs must be responded to, and the public must be encouraged to participate in policymaking. (f) Public administration must be accountable. (g) Transparency must be fostered by providing the public with timely, accessible and accurate information (Government Gazette, 1996).</p>	National Government	1994
New Regulations 2014 in terms of NEMA	Legislation consulted during the environmental impact assessment process to determine whether any listed activities would be triggered. The Regulations were also consulted to determine inter alia the requirements regarding the contents of Scoping reports and the public participation process that should be followed.	National & Provincial (DEA And DEDECT)	7 April 2017
National Water Act (36 OF 1998)	National Water Act (NWA), 1998 (Act 36 of 1998) is the primary statute providing the legal basis for water management in South Africa and has to ensure ecological	Department of water and sanitation	1998

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>integrity, economic growth and social equity when managing and using water.</p> <p>The major objectives of the National Water Act are to:</p> <ul style="list-style-type: none"> •Aid in providing basic human needs; •Meet the growing demand of water in a sustainable manner; •Ensure equal access to water and use of water resources; •Protect the quality of water of natural resources; •Ensure integrated management of water resources; •Foster social and economic development; and •Conserve aquatic and related ecosystems. <p>Section 19 of the National Water Act states that the person responsible for land upon which any activity is or was performed which causes, has caused or is likely to cause, pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.</p>		
<p>National Environmental Management: Biodiversity Act (NEMBA) (ACT NO. 10 OF 2004)</p>	<p>The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004), provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.</p> <p>In terms of Chapter 4 of the Above Act:</p> <p>52. (1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection.</p> <p>(b) An MEC for environmental affairs in a province may, by notice in the Gazette, publish a provincial list of ecosystems in the province that are threatened and in need of protection.</p> <p>(2) The following categories of ecosystems may be listed in terms of subsection:</p>	<p>National & Provincial (DEA And DEDECT)</p>	<p>2004</p>

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	<p>(a) critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;</p> <p>(b) endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;</p> <p>(c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and</p> <p>(d) protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs (a), (b) or (c).</p> <p>(3) A list referred to in subsection (1) must describe in sufficient detail the location of each ecosystem on the list. 53 (1) The Minister may, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process.</p> <p>(2) A threatening process, identified in terms of subsection (1) must be regarded as a specified activity contemplated in section 24(2)(b) of the National Environmental Management Act (1998) and a listed ecosystem must be regarded as an area identified for the purpose of that section.</p>		
<p>GN 1003 of 2020, Alien and invasive species lists, 2020 in terms of the National Environmental Management: Biodiversity Act (NEMBA) (ACT NO. 10 OF 2004).</p>	<p>Notice 1: Notice in respect of Categories 1a, 1b, 2 and 3, Listed Invasive Species, in terms of which certain Restricted Activities are prohibited in terms of section 71A(1); exempted in terms of section 71(3); require a Permit in terms of section 71(1)</p> <p>Notice 2: Exempted Alien Species in terms of section 66(1).</p> <p>Notice 3: National Lists of Invasive Species in terms section 70(1).</p>	<p>National & Provincial (DEA And DEDECT)</p>	<p>2020</p>

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
National Environmental Management: Protected Areas Act (ACT NO. 57 OF 2003)	<p>This Act aims to provide for a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity. The Protected Areas Act tries to ensure the protection of the entire range of biodiversity, referring to natural landscapes and seascapes. The Act makes express reference to the need to move towards Community Based natural Resource Management (CBNRM) as its objectives include promoting the participation of local communities in the management of protected areas. The purpose of the Act is:</p> <ul style="list-style-type: none"> •To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes and their ecological integrity. •To conserve biodiversity in those areas; •To protect South Africa's rare species; •To protect vulnerable or ecologically sensitive areas; •To assist in ensuring the sustained supply of environmental goods and services; •To provide for the sustainable use of natural and biological resources; •To create or augment destinations for nature-based tourism; •To manage the interrelationship between natural environmental biodiversity, human settlement and economic development; •To contribute to human, social, cultural, spiritual and economic development; •To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species. <p>This Act further stipulates various criteria which must be met before an area can be declared as a special nature reserve, national park, nature reserve and protected environment. It also prescribes a range of procedures, including consultation and public participation procedures which must be followed before any of the kinds of protected areas are declared.</p>	National & Provincial	2003
National Heritage Resources Act, Act No. 25 of 1999	<p>Legislation consulted during the impact assessment process, to determine the legal requirements relating to the management of heritage resources that are present in and around the site.</p> <p>The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological</p>	SAHRA	1999

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	objects, paleontological material and meteorites are the property of the State. "Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority".		
National Environmental Management: Waste Act, Act No. 59 of 2008, DEDECT together with the List of Waste Activities that Have, or are Likely to Have, a Detrimental Effect on the Environment, GN No. 921 of 29 November 2013	Legislation consulted to determine whether a waste licence will have to be obtained for the development. The purpose of this Act relates to the proper disposal of waste. The Act also provides for the waste related activities where a Waste Licence is required. This includes the recycling and refining of waste.	National & Provincial (DEA And DEDECT)	2008
<i>Hazardous Substances Act (15 of 1973)</i>	This Act provides for the control of substances, which may cause injury, ill health or death by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature. It divides these hazardous substances into groups relating to the degree of danger and provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.	National & Provincial (DEA And DEDEAT)	1973
<i>Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002</i>	The Act distinguishes between mining permits and mining rights as follows: Mining Permit: Required where the activity will last less than two years and affects an area of less than 1.5ha in extent (valid for 3 years). In terms of the Act a mining permit requires a submission of an Environmental Management Plan (EMP to DME for approval prior to the onset of activities). Mining Right: Required for larger mining operations (renewable and valid for 30 years). In terms of the Act a mining right requires the submission of an Environmental Management Programme (EMProg) to DME for approval prior to the onset of activities. In light of their limited spatio-temporal extent, borrow pits (for the provision of construction material) and quarry operations would typically require a mining permit.	Relevant Provincial Authorities.	2002

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
	The closure of borrow pits requires the submission of a closure application; this must be submitted within 180 days after ceasing operations. It is important to recognise that the mining right/permit holder's liability persists until such time as a Closure Certificate has been issued by DME.		
<p><i>National Environmental Management: Air Quality Act (Act 39 of 2004) and:</i></p> <p><i>Government Notice 893 in Government Gazette 37054 dated 22 November 2013. Commencement date: 22 November 2013</i></p> <p><i>As amended by:</i></p> <p><i>Government Notice 551 in Government Gazette 38863 dated 12 June 2015. Commencement date: 12 June 2015.</i></p> <p><i>Government Notice 1207 in Government Gazette 42013 dated 31 October 2018. Commencement date: 31 October 2018.</i></p> <p><i>Government Notice 687 in Government Gazette 42472 dated 22 May 2019. Commencement date: 22 May 2019.</i></p> <p><i>Government Notice 421 in Government Gazette 43174 dated 27 March 2020. Commencement date: 27 March 2020.</i></p>	<p>To protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social Development.</p> <p>The following Categories were considered for this application:</p> <p><u>Category 1: Combustion Installations</u> <u>Subcategory 1.1: Solid Fuel Combustion Installations</u> <u>Description:</u> Solid fuels combustion installations used primarily for steam raising or electricity generation. <u>Application:</u> All installations with design capacity equal to or greater than 50 MW heat input per unit, based on the lower calorific value of the fuel used. <u>Outcome:</u> The proposed development will not trigger this Category, as only a maximum of 2 MW heat inputs per unit will be generated.</p> <p><u>Category 10: Animal Matter Processing</u> <u>Description:</u> Processes for the rendering cooking, drying, dehydrating, digesting, evaporating or protein concentrating of any animal matter not intended for human consumption. <u>Application:</u> All installations handling more than 1 ton of raw materials per day. <u>Outcome:</u> The proposed development will be triggered by the Category, as only a maximum of 150kg per day will be processed.</p>	<p>Relevant Provincial Authorities.</p>	<p>2004</p>
<p><i>The Conservation of Agricultural Resources Act (Act 43 of 1983)</i></p>	<p>This Act regulates the flow pattern of runoff water, control of weeds and invader plants.</p>	<p>Relevant Provincial Authorities.</p>	<p>1983</p>
<p><i>National Veldt and Forest Fire Act (Act 101 of 1998)</i></p>	<p>Chapter 4 places a duty on owners to prepare and maintain firebreaks.</p>	<p>Relevant Provincial Authorities.</p>	<p>1998</p>
<p><i>National Forests Act, Act 84 of 1998 (NFA) DEDECT with GN1602 of December 2016.</i></p>	<p>During the construction phase of the development certain protected trees may be affected. Licences will have to be obtained from the Minister before the affected trees may be cut, disturbed, damaged or destroyed. GN1602 of December 2016 contains the list of protected trees.</p>	<p>National and Provincial authorities.</p>	<p>1998</p>

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
<i>Occupational Health and Safety Act (Act 85 of 1993)</i>	To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery and the protection of persons other than persons at work against hazards to health.	Relevant Provincial Authorities.	1993

The study is conducted in such a way as to comply with the instructions regarding such studies and reports (as contained within the above-mentioned documents).

The following aspects will be dealt with:

SCHEDULE

Actions	Timeframe
1. Project Initiation and Scoping Phase	
1.1 Communication with authorities and source and analyse relevant baseline information and undertake site inspections	5 days
1.2 Identify key interested and affected parties (I&APs)	1 day
1.3 Compilation of terms of reference for specialist studies	2 days
1.4 Commission specialist studies	1 day
1.5 Compile Environmental Application Form for the project and submit to the authorities	Once the Environmental Application form has been submitted, the scoping report which has been subject to public participation (30 days) needs to be submitted within 44 days
1.6 Compile draft Scoping Report (SR) and make available to the public for a 30 day commenting period	5 days for compilation and 30 days for commenting period
1.7 Prepare an Information Sheet (summary of the draft SR) and distribute to I&APs	1 day
1.8 Compile and publish media notices (for the EIA) in relevant newspapers	7 days
1.9 Compile and place poster/s along the boundary of the site	1 day
1.10 Receive and address first round of comments from public	3 days
1.11 Should the draft SR require substantial changes, these changes will be incorporated into the final SR and distributed	The competent authority must within 43 days of receipt of the scoping report accept / refuse the report with our without conditions
1.12 Address comments received on the SR, finalise Scoping Report and submit to authorities	As above
1.13 Compile a Plan of Study for the assessment phase and submit to authorities for approval	As above
The total time allowed for the Scoping phase of the application	87 days
2. Assessment Phase	
2.1 Undertake assessment phase by assessing and evaluating potential impacts identified in the Scoping phase.	5 days
2.2 Review and manage specialist studies required.	Ongoing
2.3 Compile a draft Environmental Impact Report (EIR).	5 days
2.4 Compile a draft Environmental Management Plan for the Construction phase.	Included above
2.5 Compile an Information Sheet (summary of EIR) and distribute to identified I&APs	1 day

2.6 Distribute DEIR to I&APs	1 day
2.7 Allow the identified public to provide comment within a 30 day period on above report.	3 days for compilation and 30 days for commenting period
2.8 Address comments received and finalise EIR	3 days
2.9 Should the draft EIR require substantial changes, these changes will be incorporated into the final EIR and distributed for a 21 day commenting	3 days plus 21 day commenting period
2.10 Finalise EIR and update comments and response table for submission to authorities	5 days
2.11 Submit EIR to authorities for a final decision	1 day (The department requires the submission of the Final EIR within 106 days of the approval of the Scoping report), therefore all information from the client's side must be provided within this timeframe to ensure the application is not withdrawn)
2.12 Once the decision is issued, all I&Ps must be formally informed of the decision	The Competent Authority has 107 days from the date of receipt of the EIR and EMPr to determine the application
Total number of days allowed for the compilation and consideration of the EIR	213 (may require additional 50 days public participation and consideration)
TOTAL AMOUNT OF DAYS:	300-350 days

6. NEED AND DESIRIBILITY

Both the proposed development of centre pivots and chicken broilers are in line with national and provincial priorities. The South African commercial poultry industry is the single largest contributor to agricultural related GDP, and an exemplar of the country's commercial livestock sector, with its production systems and efficiency comparable with other global intensive production systems (DAFF, 2018). Section 5 of the North West SDF, Provincial priority area 3 states: "agriculture production need to be expanded, with emphasis on well-supported small-scale farming, communal farmers, commercial farmers and cooperatives. The provincial objectives are:

- 35 734 direct jobs must be created through the agriculture, agro-processing and related sectors by 2030.
- Maintain a positive trade balance for primary and processed agricultural products.
- Agriculture must maintain an average growth rate of 8.5 per cent between now and 2030. Against this growth rate, the Gross Value Added (GVA) contribution of the sector will increase from R 3.39 million to R 17.31 million in 2030 (2010 R-values).
- The sectoral Gross Value Added (GVA) contribution of agriculture will expand from 2.3 per cent in 2010 to 4.1 per cent in 2030 (Actions: Agriculture Development: Expand commercial agriculture)"

Specifically in relation to irrigated land; according to Dr Damien Jourdain, researcher at CIRAD (Agricultural Research for Development) 65% of South Africa's territory receives less than 500mm/y in average annual rainfall which is the limit for successful 'dryland cultivation of crops'. Agriculture and Irrigation represent 61% of South Africa's water demand (in line with global average). Municipal and domestic use of water represents 27% of the water usage. This figure is high to due to a lot of waste in the systems. Irrigation is very important to the agricultural sector as it accounts for 30% of the country's crops. The agricultural and agro-industrial sectors contribute to a combined 15% of the GDP and are key to the food industry and job creation opportunities. 98% of the available water is already allocated and this puts pressure on the 'ecological reserve' which is the minimum amount of water necessary to keep the ecosystem functional. With population increase and need to feed this increasing population, with no doubt, demand will grow up in the future. Risks of shortfall are high and already taking place in some places (e.g., Cape Town 2018). Yet SA Government targets an increase of irrigated areas by 50% (NDP's Vision 2030).

"Rain-fed agriculture sustains 60% of global food production. Rain-fed cropping systems are highly dependent on climatic conditions and vulnerable to changes in precipitation and temperature patterns, which are intensifying as a result of global warming. Climate change is expected to alter rainfall patterns and exacerbate water- and heat-stress events over rain-fed croplands. Irrigation expansion over water-stressed rain-fed croplands is an effective agricultural adaptation measure in response to climate change. Irrigated cropping systems, which use both rainwater ("green water") and surface water and/or groundwater (or "blue water"), contribute to a more reliable and resilient crop production while boosting agricultural productivity. In fact, the use of irrigation enables reliable water supply and can also alleviate crop's heat stress, highlighting how important irrigation is to food-producing regions that will be affected by climate change". (Roza, 2020)

"Centre pivot irrigation refers to the use of a mechanised irrigation system that can help to irrigate crops by maintaining a circular pattern around a central pivot. It largely consists of a lengthy radial pipe that is supported by sprinkling towers. These towers pivot around a centre point of the whole mechanism.

The radial pipe itself consists of equally spaced nozzles in order to supply water to the surrounding crops. As the pipe gradually rotates, the water is uniformly released from the nozzles in order to offer nutrition to the crops.

By using the radial pipe system of centre pivot irrigation, water is made to travel along a straight line down the field. All the nozzles of the pipe have the same flow rate and are made to cover the same area as well. This helps to greatly boost the uniformity of the water being applied to the crops.

The design of this system is such that the sprinklers located near the pivot tend to cover a smaller area in comparison to the nozzles located at the end of the pivot. Research has revealed that a pivot system is one of the most efficient methods of irrigating farmlands. It allows farmers to cover numerous acres of land in a relatively small span of time, and it can also be used to apply pesticides and fertilizers to the crops with equal efficiency.

Additionally, this system only relies on a single piece of machinery to be able to execute on numerous important elements of farming

The Advantages of a Centre Pivot Irrigation System

The following are some of the major advantages of a centre pivot irrigation system:

Uniform Application of Water

The manner in which a centre pivot system is designed helps in the uniform application of water across large sections of farmlands.

Reducing Dependency on Labour

As the centre pivot system allows farmers to execute on various farming practices with a single machine, it greatly reduces the dependency on labour across the harvest season. Farming is seen as an unreliable sector and maintaining labour forces in this industry can be challenging to many farmers. The use of technology such as centre pivot irrigation systems help to reduce the stress on farmers caused by the inconsistency in the availability of labour.

Saving Resources

It is possible to operate the mechanism of centre pivot irrigation at lower pressures as per the requirement of the farmers. This helps to conserve enormous amounts of energy in the long run. Additionally, this method of irrigation is also known to be far more efficient when it comes to the utilization of water. It helps to prevent water runoff and ensures that the water bills incurred by farmers is greatly reduced.

Additionally, using this system also makes it easier for farmers to manage the water levels in their soil. The semi-automatic nature of this mechanism, coupled with the lateral movement of the sprinklers makes managing water levels easier for farmers. It is seen that the efficiency of water application in centre pivot irrigation is nearly 80%, and this is far higher than traditional methods.

Possibility of Automation

Modern centre pivot irrigation systems also come with a timer feature that allows farmers to apply water in their farms at any time of the day or night. This can be executed without the farmers even leaving their homes. The advantage of automating this element of farming is enormous and it helps save farmers a lot of time and effort.

Versatile System

It is possible to utilize the centre pivot system to nourish nearly all types of crops. This includes fruit trees, vegetables, and arable crops. Thus it makes sense for farmers growing multiple types of crops across the year to rely on this system of irrigation. (Centre Pivot Irrigation: Improving Water Distribution to Crops; <https://stories.pinduoduo-global.com/agritech-hub/center-pivot-irrigation>.)”

In South Africa 6 282 000 people are employed in the agricultural sector, including farm employees and domestic workers. This contributes to over 12% of the South African population employed in the South African agricultural sector. The proposed development will contribute to creating employment in this sector as well as contributes to food security in South Africa.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

7. ALTERNATIVES

One of the objectives of an EIA is to investigate alternatives to the proposed project. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. In order to ensure that the proposed development enables sustainable development, feasible alternatives must be explored (S. Cliff, 2015).

The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process. Alternatives should be considered as a norm within the Environmental Process (S. Cliff, 2015).

The alternatives considered for the proposed development includes land use alternatives (including the No-go option). The various alternatives will be assessed in the EIAR, in terms of environmental, social and technical feasibility.

7.1 Land Use / technology alternatives

Preferred alternative: To establish arable land (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses.

Alternative 1: To establish arable land on all areas (no chicken broilers) which will then be irrigated by means of flood irrigation.

Alternative 2: “No-go” alternative

7.1.1 The use of Centre pivots as means of irrigation and establishing 8 chicken broiler houses

According to: Frontiers in sustainable food systems: “The South African Commercial poultry (broiler and layer) industry is the single largest contributor to agricultural related Gross Domestic Product and an exemplar of the country’s commercial livestock sector. Broiler meat remains the most affordable meat option and plays an important role in household food and nutrition in South African food system. Furthermore, broiler meat is regarded by some as the least environmentally damaging meat option as intensive production has limited the direct impacts on land use” <https://www.frontiersin.org/articles/10.3389/fsufs.2021.650469/full> (visited 22/04/2022).

As such, the chicken broilers proposed will contribute to SA’s food security as well as being regarded as environmentally the least damaging meat option in SA’s commercial livestock sector. Thereby making this land use on the area proposed the preferred alternative.

Considering alternative watering methods in relation to the 3 areas to be irrigated, it is important to understand the preferred method of irrigation: A centre-pivot irrigation system consists of a fixed, pivot structure with a long pipeline to which sprinklers are attached for dispersing water. The pipeline rotates around the central pivot in a straight radial-arm fashion, riding on wheeled tower structures and creating a large irrigated circle pattern on planted crops.

The main pipe is connected to a pumping station that pumps water from a source. The water flows to the central tower from where it is distributed to the sprinklers. In order for the irrigation to be uniform, the discharge of sprinklers closer to the central tower is lower than the discharge of sprinklers located at a larger distance.

The control panel enables the operator to set when to start and stop watering, as well as the direction in which the machine moves. Therefore, depending on the type and capabilities of the control panel used, the system can be operated either manually or automatically.

The advantages of centre pivots over other methods of irrigation includes uniform application of water to large fields, low energy consumption, relatively low cost, and the savings in labour required for irrigation. The average life of a centre pivot is more than twenty-five years of annual usage, resulting in a very low total life-time cost of ownership. Its ability to operate over undulating ground gives the additional advantage of not requiring costly land levelling, as is the case with other forms of irrigation. Chemicals can also be applied to the crop through aqueous solution with the irrigation water or by separate spray manifolds mounted on the pipeline structure. Water runoff can be virtually eliminated by the precise application of only the amount of water that can be absorbed by the soil.

There is only a limited amount of fresh water in the world, and each farmer has a limited number of days and money to invest and bring his crop to market. The reported application efficiencies for new well designed centre pivots are generally in the 80-95% range, compared to 50-90% for surface irrigation systems.

7.1.2 To use all the land as fields (thus to not implement the option of the proposed chicken broilers) and to irrigate by means of flood irrigation (Alternative 2)

The technology alternative of making use of a flood irrigation system as a means to irrigate the fields. Since the beginning of domestic farming, ancient farmers used flood irrigation. Today, farmers still flood their fields to water their crops. It is a simple method, but one that is labour intensive, and not very efficient.

Levelling of fields: Flood irrigation uses gravity to transport water, and, since water flows downhill, it will miss a part of the field that is at a higher elevation. Farmers are using levelling equipment, to scrape a field flat before planting. This allows water to flow evenly throughout the fields.

Capture and reuse of runoff: A large amount of flood-irrigation water is wasted as it runs off at the edges and back of the fields. Farmers can capture the runoff in ponds and pump it back up to the front of the field where it is reused for the next cycle of irrigation.

In order to get the right amount of irrigation water at the end of the flood-irrigated field, the field must be over-watered at the beginning of the flood run. More water than the crop requires will soak into – and sometimes through – the soil profile at the beginning of a levelled flood field to get the desired water application at the end of the flood run.

Research performed by scientists at the University of California-Davis evaluated and compared centre pivot irrigation sprinklers to furrow flood irrigation. The conclusion was that when compared to flood/gravity irrigation practices, the precise, uniform water application provided by centre pivot irrigation sprinklers often results in higher crop yields. Combining the reduction of water use with pumping energy cost reductions, centre pivot sprinkler irrigation delivers solid economic benefits. And with increasing shortages of farm labour, the convenience of centre pivot irrigation will continue to be an effective long-term management tool for the successful modern farmer.

7.1.3 No-go Alternative

When considering the “no-go” Alternative for this development one has to consider the implication of not having developed the centre pivot cultivated fields. In the assessment of this option it is important to note that when the irrigation scheme was initially developed back in 1933 the only “technology” available for irrigation was flood irrigation as there was no electricity available in the area. Farmers were allocated water quotas that were registered against the Farms. These quotas were calculated with flood irrigation as a means of irrigation in mind and resulted in high volumes of water being allocated per hectare. Irrigation fields were only developed on the “down slope” side of the canal as gravity was the only method of water distribution.

With Electricity becoming available in the mid 1950's, alternative means of irrigation became available. New technologies has made it possible for farmers to irrigate more hectares of land with the same quota. This has resulted in the clearance of more hectares of indigenous vegetation in order to establish arable land. This process has continued since then as technology continued to improve. Some Farmers (Including the Applicant) has also bought land from their neighbours. Some of these farms were never upgraded with modern irrigation systems and as the new owner saw the opportunity to modernise and as such more hectares of irrigation fields were developed.

According to: Frontiers in sustainable food systems: "The South African Commercial poultry (broiler and layer) industry is the single largest contributor to agricultural related Gross Domestic Product and an exemplar of the country's commercial livestock sector. Broiler meat remains the most affordable meat option and plays an important role in household food and nutrition in South African food system. Furthermore, broiler meat is regarded by some as the least environmentally damaging meat option as intensive production has limited the direct impacts on land use" <https://www.frontiersin.org/articles/10.3389/fsufs.2021.650469/full> (visited 22/04/2022).

Had the "no-go" Alternative been implemented, the advantages of being able to irrigate more land, more efficiently, would not have been possible and the chicken broilers not contributing to SA's food security. Thereby making this land use on the area proposed the preferred alternative.

8. DESCRIPTION OF THE ENVIRONMENT THAT MAY BE AFFECTED BY THE PROJECT

8.1 BIO-PHYSICAL ASPECTS

8.1.1 GEOLOGY AND SOIL

According to the 1:250 000 Geological Map (2526 Rustenburg) site is underlain by is underlain by undifferentiated surface deposits (Q) of the Daspoort Formation of the Pretoria Group and the Transvaal sequence. The Geology and the surface deposits has rendered the soil conditions of the site ideal for crop production. The seismic stability of the area is also favourable for the proposed development types. No dolomite occurs on site and therefore no dolomitic stability investigations will be necessary. The Department of Agriculture has also evaluated the conditions on site and has found it to be favourable.

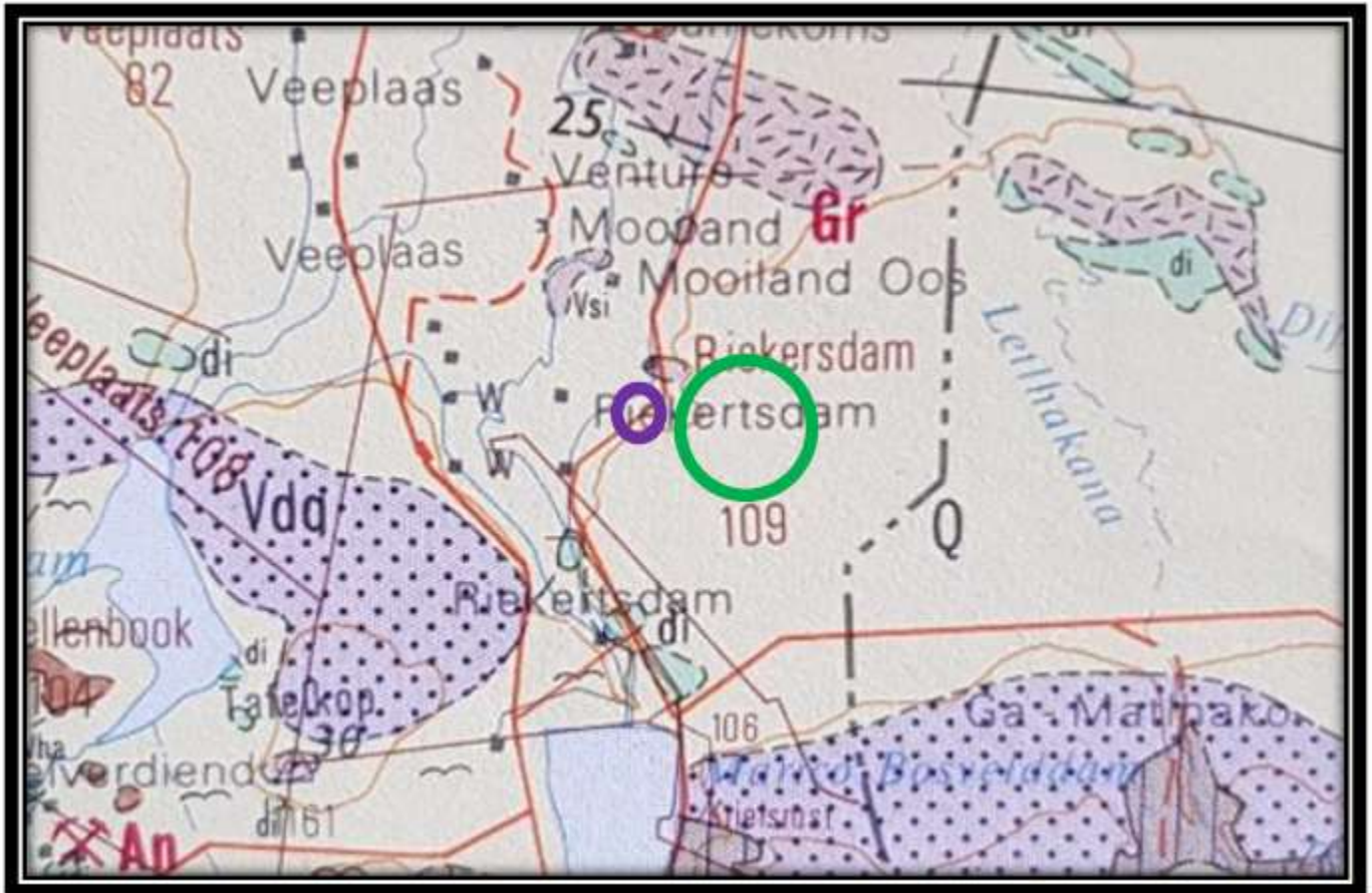


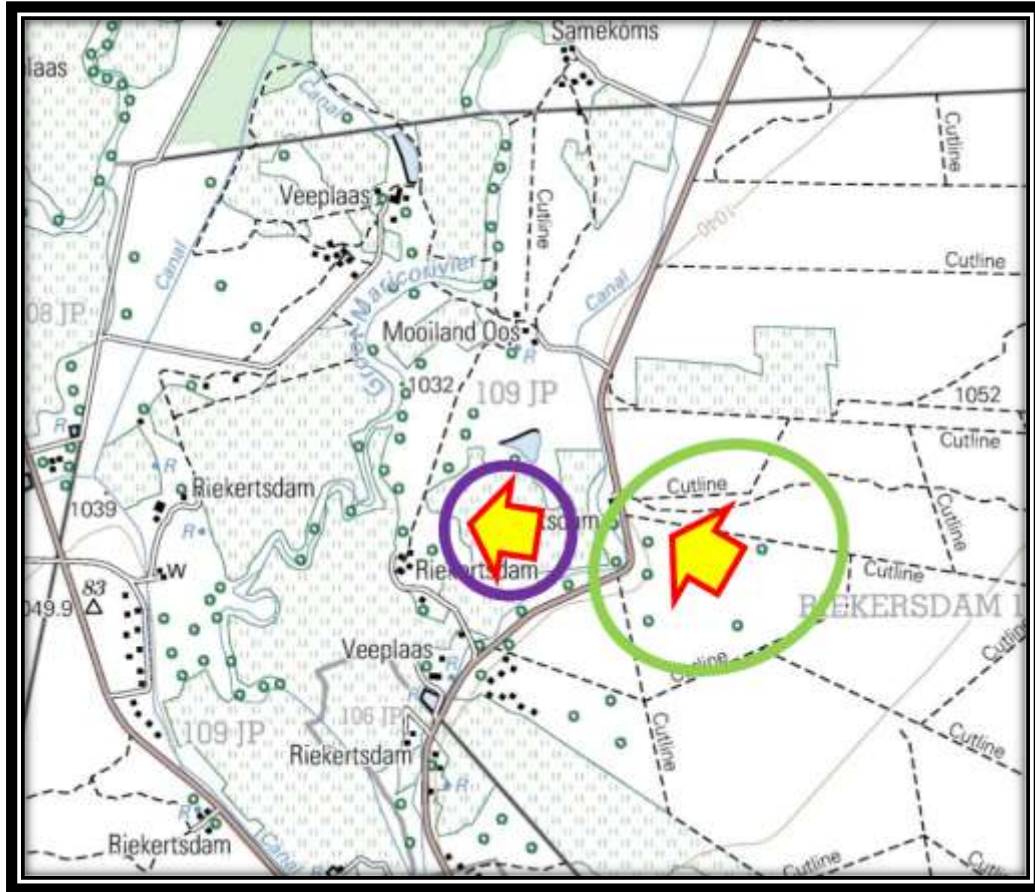
Figure 8: 1:250 000 Geological Map (2526 Rustenburg)

The green and purple circles demarcates the area proposed for arable land and the area cleared for the construction of the Chicken Broiler Houses (Defined as Q).

8.1.2 TOPOGRAPHY

The topography of the study area is relatively flat and open, with no rocky ridges or outcrops present on site. The proposed chicken broiler house site slopes towards the west-north-west from an elevation of 1045 meters above sea level in the east to an elevation of 1043 in the west. (See purple polygon on Figure below.) Whilst the area proposed for the new centre pivots slopes in a north-westerly direction from 1058 mamsl to 1044 mamsl. See green polygon on Figure below.

The topography of the area is ideal for the use of centre pivots as a method of irrigation. The flat characteristics of the area is also ideally suited for the construction of Chicken Broiler Houses.



1:50 000 Topographical Map (2526 Pella)

The purple polygon demarcates the area proposed for the Chicken houses and the green polygon demarcates the area proposed for the establishment of arable land.

8.1.3. CLIMATE

Low, A.B. 1996, recognized seven vegetation biomes in South Africa that is subdivided into 68 vegetation types. These types are mainly determined by climate but sheltering, soil type, occurrence of veldt fires, browsers (wild life), elevation and inclination and other minor factors also play a role. The boundaries for these climatic regions were determined by making use of these vegetation types. Combinations of smaller vegetation types into larger regions, which are easier to map and described from a climatic point of view, were made by Kruger. According to this Map, the site is located within a Climatic region defined as the “Central Bushveld”. See Figure 14 below.

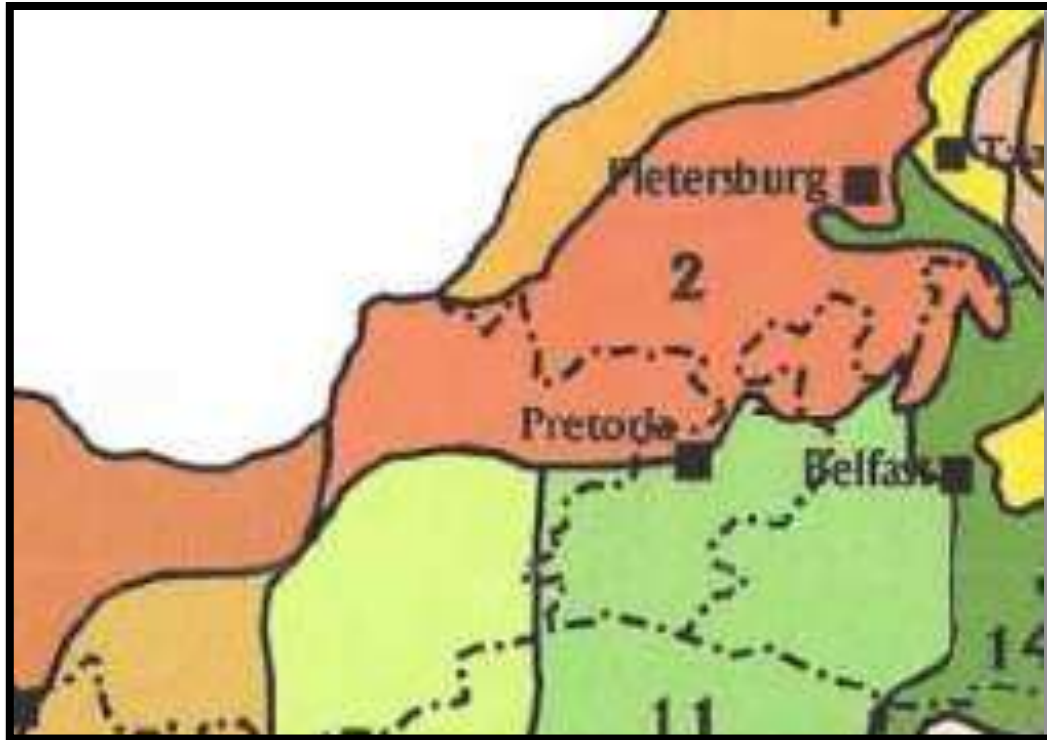


Figure 9: Extract from map produced by Kruger, A.C. Climate Regions – Climate of South Africa. Zone 2 is defined as Central Bushveld

According to the Köppen-Geiger classification the site is classified as **Bsh**. This classification is defined as Arid, Steppe, Hot arid.

Figure 15 is an illustration of the average temperatures and precipitation for the area. (https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/groot-marico_south-africa_999121) The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Groot-Marico. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

From the graph it is clear the site falls within an area that hot summers (Average daily maximum temperature for December is 32°C with the average hottest day temperature for summer being 36°C) and cold winters (Average daily minimum temperature for June and July is 5°C with the average coldest day temperature for winter being -4°C).

Precipitation normally occurs in the form of rain and hail. This is a summer rainfall area with a yearly average of 548mm. The highest monthly average rainfall occurs in January (With and average rainfall of 102mm) and December (With and average rainfall of 93mm). The lowest monthly average rainfall occurs in July (With and average rainfall of 1mm) and August (With and average rainfall of 3mm)

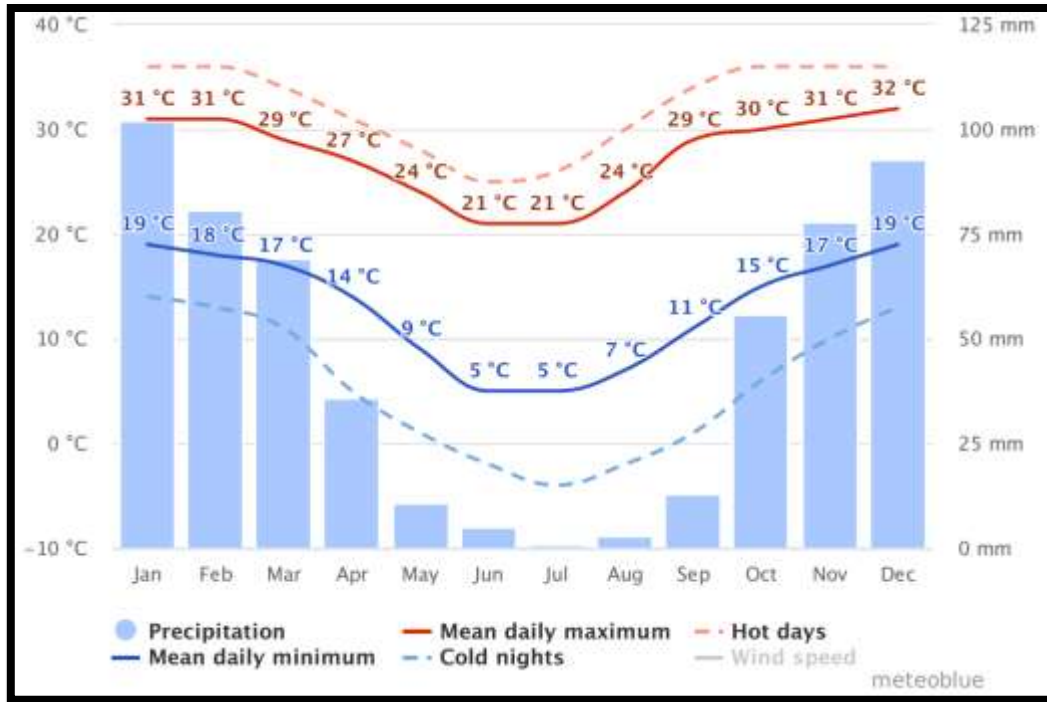


Figure 10: Illustration of the average temperatures and precipitation for Groot Marico.

Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/groot-marico_south-africa_999121

The above mentioned climatic extremities highlights the need for irrigation in the area. The fact that there is such a huge difference in the average rainfall between winter and summer months, makes it almost impossible to rely solely on rainfall for cultivation of agricultural products.

Climate Change

According to: WIREs Climate Change 2014, "Climate change is a key concern within South Africa. Mean annual temperatures have increased by at least 1.5 times the observed global average of 0.65°C over the past five decades and extreme rainfall events have increased in frequency. These changes are likely to continue. Climate change poses a significant threat to South Africa's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity. Considering South Africa's high levels of poverty and inequality, these impacts pose critical challenges for national development. In relation to water, impact studies for the water resources sector have begun to look beyond changes in streamflow to changes in the timing of flows and the partitioning of streamflow into base flows and stormflows, reservoir yields, and extreme hydrological events. Spatially the eastern seaboard and central interior of the country are likely to experience increases in water runoff. Higher frequencies of flooding and drought events are projected for the future. Complexities of the hydrological cycle, influences of land use and management and the linkages to society, health, and the economy indicate far higher levels of complexity in the water resources sector than in other sectors. What has emerged is that land uses that currently have significant impacts on catchment water resources will place proportionally greater demands on the catchment's water resources if the climate were to become drier. The influence of climate change on water quality is an emerging research field in South Africa, with assessments limited to water temperature and non-point source nitrogen and phosphorus movement. A critical interaction that has not been explored is between changes in water quality and quantity and the combined impacts, such changes might have impact on various types of water use, e.g., irrigation, domestic consumption, or aquatic ecosystems support".

Rain-fed agriculture sustains 60% of global food production. Rain-fed cropping systems are highly dependent on climatic conditions and vulnerable to changes in precipitation and temperature patterns, which are intensifying as a result of global warming. Climate change is expected to alter rainfall patterns and exacerbate water- and heat-stress events over rain-fed croplands. Irrigation expansion over water-stressed rain-fed croplands is an effective agricultural adaptation measure in response to climate change. Irrigated cropping systems, which use both rainwater (“green water”) and surface water and/or groundwater (or “blue water”), contribute to a more reliable and resilient crop production while boosting agricultural productivity. In fact, the use of irrigation enables reliable water supply and can also alleviate crop’s heat stress, highlighting how important irrigation is to food-producing regions that will be affected by climate change.

“Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. In December 2015, 196 Parties to the U.N. Framework Convention on Climate Change (UNFCCC) adopted the Paris Agreement, a legally binding framework for an internationally coordinated effort to address climate change. It aims to hold the rise in global average temperature by 2100 to well below 2°C above pre-industrial levels. Researchers are assessing how much mitigation will be needed by various sectors worldwide to meet the global target, including how much mitigation is feasible.

Because livestock emissions are estimated to represent 14.5% of anthropogenic GHG emissions globally, it is generally acknowledged that the livestock sector plays an important role in climate change. How much of a role the sector can play in attaining the global target of the Paris Agreement is unknown for now, especially in view of projections that worldwide livestock production will increase by about 70% between 2010 and 2050 to meet growing demand, especially in developing countries.

Research has identified a range of Green House Gasses mitigation options for the livestock sector. A number of approaches are believed to be promising, but no single option has “hit the sweet spot” of reducing emissions dramatically while not harming animals or dampening production of farms and ranches. Adoption of more efficient technologies and practices is key to reducing emissions. Possible technologies and practices include the use of better quality feed and feed balancing to lower enteric and manure emissions. Manure management practices can assist in recovery and recycling of nutrients and energy. Technologies such as feeding additives, vaccines that reduce the microorganisms that produce methane, and genetic selection methods are believed to have potential to reduce emissions but require further development. Some believe that reducing the livestock sector’s contribution to climate change, while also ensuring that nutritional security and health needs are supported, is an urgent global research and investment priority.” (Source: EveryCRSReport.com, University of North Texas Libraries Government Documents Department Raw Metadata: JSON).

8.1.4. SURFACE DRAINAGE

The area lies within the drainage basin of the Groot Marico River. The river starts off as the Groot Marico River at the Eye of Marico, near Rustenburg and Swartruggens in the North West Province of South Africa. The source of the river is a large dolomitic hole in the ground with clear water, which is also a spectacular scuba diving spot. It flows northwards as the Great Marico and further downstream the smaller Klein Marico River joins forces. For a stretch it is named Madikwene River, but after the Sehubyane River (Sandsloot) joins its left bank, it reverts to the name Marico. It continues flowing northwards, bending north-eastwards and forming the border between South Africa and Botswana. Further downstream the Crocodile River joins the Marico River from the right and the name of the stream after the confluence becomes the Limpopo River. About 5 km short of the confluence the Notwane River joins the Limpopo from the southwest.

The Marico River is part of the Crocodile (West) and Marico Water Management Area. The site is located between 1 and 3 kilometres north of the dam wall of the Marico-Bosveld Dam. The Marico-Bosveld Dam is a homogeneous earth-fill type

dam. The dam was established in 1933 and serves mainly for irrigation purposes. The dam was built during the Great Depression of 1933. 75% of the labour was white and 25% was black. The main engineer on the project was Timothy d'Oliveira. The dam was built to provide work and income to people at the time.

The study area itself is located on an area that is drained by overland flow. No streamlines are found on the proposed site. Drainage at the site occurs in a North- westerly direction towards the Groot Marico River that is situated 1,2 kilometre west of the area. The area proposed for the construction of the Chicken Broiler Houses is located between 700 meters and 380 meters from the Groot Marico River that is located to the west of the site. Drainage is in a west-north westerly direction.

No wetlands or riparian zones are found on or near the site and no erosion by sheet flow is evident on site.

8.1.5. GROUND WATER

Irrigation is capable of altering both quality and quantity of groundwater resources (Bouwer, 1987). Previous works in many regions worldwide reported a variety of effects of irrigation on groundwater resources, such as **increased aquifer recharge** in areas irrigated with surface water (Jiménez-Martínez et al., 2009; Kendy and Bredehoeft, 2006; Ochoa et al., 2007); depletion of groundwater resources where it supplies irrigation demand (Leng et al., 2014; Pfeiffer and Lin, 2014; Scanlon et al., 2012), and impairment of groundwater quality (Chen et al., 2010; Gallegos et al., 1999; Rattan et al., 2005; Schmidt and Sherman, 1987; Yesilnacar and Gulluoglu, 2008). (Rotiroti, 2019)

The Groot Marico River, that feeds the Marico Bosveld Dam, starts at the Eye of the Marico that is water originating from a Dolomitic aquifer. The dolomitic groundwater in the North West province is a valuable natural resource, which provides a reliable supply of water to towns, rural settlements, industries, agriculture and other activities in an area where surface water resources are negligible. Groundwater also sustains the flow of several springs, wetlands, and river channels, and is the lifeline of the ecology of these freshwater systems. Due to the hidden nature of groundwater, the arising management challenges are highly complex.

Water used by the Applicant for irrigation purposes is obtained from the irrigation scheme managed by the Marico Bosveld GWS. The Marico Bosveld GWS has a total scheduled area of 2 523 ha and an allocation of 5 300 m³/ha. The full quota is 13 371 900 m³ with a total of 309 abstraction points. The main source of irrigation water is thus in the form of surface water and the impact of the activity on the groundwater quantity is considered to be positive as the applicant has noted an increased aquifer recharge as fields are irrigated with surface water. The construction of the Marico Bosveld Dam has also resulted in a noticeable increase in groundwater availability on site.

The quality of the groundwater is also considered to be pristine as the applicant has had water quality tested, as he intended to bottle and sell the water. Results proved that the water was too clean for bottling purposes as it contained almost no nutrients or minerals.

In relation to the proposed chicken broilers, it could adversely affect ground water if proper steps are not implemented in order to prevent pollution from reaching the groundwater. If proper mitigation and pollution prevention steps are taken during the planning, implementation and post-construction phases it is highly unlikely that the groundwater will be affected. The eventual influence should therefore be one of low significance, probability and intensity.

Possible infiltration into the groundwater have been taken into account. During the construction phase, no spills of lubricants or construction worker sewage should be allowed to pollute the ground water. Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures, especially within these relative flat areas.

8.1.7. FLORA AND FAUNA HABITAT

The site is situated part of the Savanna Biome which is represented by the Zeerust Thornveld vegetation type (Mucina & Rutherford, 2006). A brief overview of the vegetation type, which serves as an outline of the ecological context of the site, follows.

SVcb 3 Zeerust Thornveld

Distribution: The Zeerust Thornveld is found in South Africa in the North West Province: Extends along the plains from the Lobatsi River in the west via Zeerust, Groot Marico and Mabaastad to the flats between the Pilanesberg and western end of the Magaliesberg in the east (including the valley of the lower Selons River). Altitude mainly 1000 – 1250 m (Mucina & Rutherford 2006).

Vegetation and landscape features: Deciduous, open to dense short thorny woodland, dominated by *Acacia* species, with herbaceous layer of mainly grasses on deep, high base- status and some clay soils on plains and lowlands. Also between rocky ridges of SVcb 4 Dwarsberg-Swartruggens Mountain Bushveld (Mucina & Rutherford 2006).

Geology and soils: Sediments of the Pretoria Group (Transvaal Supergroup) in this area, particularly the Silverton and Rayton Formations, are mostly shale with less quartzite and conglomerate. Carbonates, volcanic rocks, breccias and diamictites also occur in the Pretoria Group. Bronzite, hartzburgite, gabbro and norite of the Rustenburg Layered Suite (Bushveld Igneous Complex) are also found. Soils are mostly deep, red-yellow, apedal, freely drained with high base status also with some vertic or melanic clays. Land types mainly Ae and Ea.

Climate: Summer rainfall with very dry winters. Mean annual precipitation has a relatively narrow range of 550 - 600 mm. Frost is fairly frequent in winter (Mucina & Rutherford, 2006).

Important taxa: Tall trees: *Acacia burkei*, *Acacia erioloba*. Small trees: *Acacia mellifera* subsp. *detinens*, *Acacia nilotica*, *Acacia tortilis* subsp. *heteracantha*, *Searsia lancea*, *Acacia fleckii*, *Peltophorum africanum*, *Terminalia sericea*. Tall shrubs: *Diospyros lycioides* subsp. *lycioides*, *Grewia flava*, *Mystroxyton aethiopicum* subsp. *burkeanum*. Low Shrubs: *Agathisanthemum bojeri*, *Chaetacanthus costatus*, *Clerodendrum ternatum*, *Indigofera filipes*, *Searsia grandidens*, *Sida chrysantha*, *Stylosanthes fruticosa*. Graminoids: *Eragrostis lehmanniana*, *Panicum maximum*, *Aristida congesta*, *Cymbopogon pospischilii*. Herbs: *Blepharis integrifolia*, *Chamaecrista absus*, *Chamaecrista mimosoides*, *Cleome maculata*, *Dicoma anomala*, *Kyphocarpa angustifolia*, *Limeum viscosum*, *Lophiocarpus tenuissimus*.

Note: Not all of the above listed plant species for the vegetation types occur at the site in the study area.

Vegetation on site consists of a savanna that ranges from slightly degraded to a fair condition. In some areas localised bush encroachment of the tree *Senegalia mellifera* and the shrub *Asparagus larycinus*, is present. The tree species *Vachellia tortilis* and the shrub *Grewia flava* are conspicuously abundant at the site. Other indigenous tree species include *Searsia lancea*, *Gymnosporia buxifolia*, *Dichrostachys cinerea*, *Peltophorum africanum* and *Senegalia burkei*. *Combretum hereroense* and *Olea europaea* subsp. *africana* are present in some areas. Herbaceous plant species include *Hibiscus trionum*, *Chamaecrista mimosoides* and *Solanum panduriforme*. Graminoids such as *Aristida congesta*, *Eragrostis lehmanniana*, *Heteropogon contortus*, *Setaria sphacelata*, *Cynodon dactylon* and *Urochloa mosambicensis* are visible at the site.

Alien invasive weed species are conspicuous at disturbed areas. These alien invasive weeds include *Alternanthera pungens*, *Datura ferox*, *Argemone ochroleuca*, *Schkuhria pinnata*, *Tagetes minuta*, *Bidens pilosa*, *Conyza bonariensis*, *Gomphrena celosiodes* and *Zinnia peruviana*.



Photo 5: *Vachellia tortilis* (Umbrella Thorn) which is conspicuously abundant at parts of the site.

Photo: R.F. Terblanche.



Photo 6: Foliage and fruit of *Grewia flava* (Velvet Raisin), a small indigenous tree, that is noticeable at many parts of the site.

Photo: R.F. Terblanche



Photo 7: Foliage of *Senegalia mellifera* (Black Thorn). Areas at the site where dense covers of shrub-height *Senegalia mellifera* are present, represent some localized bush encroachment.

Photo: R.F. Terblanche.



Photo 8: *Asparagus larycinus*, a widespread shrub often associated with bush encroachment, at the site.

Photo: R.F. Terblanche



Photo 9: *Combretum hereroense* (Russet Bushwillow) at the site.

Photo: R.F. Terblanche.



Photo 10: *Sida cordifolia*, a widespread herbaceous plant species, at the site.

Photo: R.F. Terblanche



Photo 11: Alien invasive succulent tree, *Cereus jamacaru*, at the site.
Photo: R.F. Terblanche



Photo 12: Flower of the alien invasive herbaceous weed, *Zinnia peruviana*, at the site.
Photo: R.F. Terblanche.



Photo 13: The butterfly species *Leucochitonea levubu* (widespread in savanna of the northern parts of South Africa) feeding on the nectar of a flower of *Sida cordifolia* at the study area.

Photo: R.F. Terblanche.



Photo 14: The widespread butterfly species *Junonia hierta*, at the site.

Photo: R.F. Terblanche

In addition to the above, the Habitat Fauna and Flora specialist concluded the following:

- Savanna at the site is represented by the Zeerust Thornveld (SVcb 3) which is **not listed** as a Threatened Ecosystem according to the National List of Threatened Ecosystems (2011).
- No Threatened or Near Threatened plant or animal species appear to be resident at the site.
- The Protected tree species *Combretum imberbe* (Leadwood), *Sclerocarya birrea* (Marula), *Securidaca longepedunculata* (Violet Tree) and *Vachellia erioloba* (Camel Thorn) occur at the study area. These trees occur at certain areas in the study area but could not be found in any large numbers. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister.
- At present the protected tree species at the site and larger study area are conserved wherever they occur, a practice that should continue.
- The scope for the site to be part of a corridor of particular conservation importance is small.
- Ecological sensitivity at the site is medium.

Site sensitivity has determined by the appointed Ecologist who has generated the following sensitivity maps. (See Figure 11a & 11b). From this it is clear that the areas cleared for the erection of the Centre Pivots can be classified as having a medium sensitivity and most of the area cleared for the construction of the Chicken Broiler Houses can be considered as Low (As this site has been cultivated in the resent past). The remainder of this area is considered to be medium.



Figure 11a: Indications of ecological sensitivity (proposed crop circles)

— Red outline Boundaries of the site

Light orange outline and shading Medium Sensitivity



Figure 11b: Indications of ecological sensitivity at the area for the construction of the chicken broiler houses.

— Red outline Boundaries of the site

Green shading Low Sensitivity

Light orange outline and shading Medium Sensitivity

8.2. SOCIO ECONOMIC FACTORS

8.2.1. SOCIAL AMENITIES

Both the proposed development of centre pivots and chicken broilers are in line with national and provincial priorities. The South African commercial poultry industry is the single largest contributor to agricultural related GDP, and an exemplar of the country's commercial livestock sector, with its production systems and efficiency comparable with other global intensive production systems (DAFF, 2018). Section 5 of the North West SDF, Provincial priority area 3 states: "agriculture production need to be expanded, with emphasis on well-supported small-scale farming, communal farmers, commercial farmers and cooperatives. The provincial objectives are:

- 35 734 direct jobs must be created through the agriculture, agro-processing and related sectors by 2030.
- Maintain a positive trade balance for primary and processed agricultural products.
- Agriculture must maintain an average growth rate of 8.5 per cent between now and 2030. Against this growth rate, the Gross Value Added (GVA) contribution of the sector will increase from R 3.39 million to R 17.31 million in 2030 (2010 R-values).
- The sectoral Gross Value Added (GVA) contribution of agriculture will expand from 2.3 per cent in 2010 to 4.1 per cent in 2030 (Actions: Agriculture Development: Expand commercial agriculture)"

Specifically in relation to irrigated land; according to Dr Damien Jourdain, researcher at CIRAD (Agricultural Research for Development) 65% of South Africa's territory receives less than 500mm/y in average annual rainfall which is the limit for successful 'dryland cultivation of crops'. Agriculture and Irrigation represent 61% of South Africa's water demand (in line with global average). Municipal and domestic use of water represents 27% of the water usage. This figure is high due to a lot of waste in the systems. Irrigation is very important to the agricultural sector as it accounts for 30% of the country's crops. The agricultural and agro-industrial sectors contribute to a combined 15% of the GDP and are key to the food industry and job creation opportunities. 98% of the available water is already allocated and this puts pressure on the 'ecological reserve' which is the minimum amount of water necessary to keep the ecosystem functional. With population increase and need to feed this increasing population, with no doubt, demand will grow up in the future. Risks of shortfall are high and already taking place in some places (e.g., Cape Town 2018). Yet SA Government targets an increase of irrigated areas by 50% (NDP's Vision 2030).

"Rain-fed agriculture sustains 60% of global food production. Rain-fed cropping systems are highly dependent on climatic conditions and vulnerable to changes in precipitation and temperature patterns, which are intensifying as a result of global warming. Climate change is expected to alter rainfall patterns and exacerbate water- and heat-stress events over rain-fed croplands. Irrigation expansion over water-stressed rain-fed croplands is an effective agricultural adaptation measure in response to climate change. Irrigated cropping systems, which use both rainwater ("green water") and surface water and/or groundwater (or "blue water"), contribute to a more reliable and resilient crop production while boosting agricultural productivity. In fact, the use of irrigation enables reliable water supply and can also alleviate crop's heat stress, highlighting how important irrigation is to food-producing regions that will be affected by climate change". (Roza, 2020)

"Centre pivot irrigation refers to the use of a mechanised irrigation system that can help to irrigate crops by maintaining a circular pattern around a central pivot. It largely consists of a lengthy radial pipe that is supported by sprinkling towers. These towers pivot around a centre point of the whole mechanism.

The radial pipe itself consists of equally spaced nozzles in order to supply water to the surrounding crops. As the pipe gradually rotates, the water is uniformly released from the nozzles in order to offer nutrition to the crops.

By using the radial pipe system of centre pivot irrigation, water is made to travel along a straight line down the field. All the nozzles of the pipe have the same flow rate and are made to cover the same area as well. This helps to greatly boost the uniformity of the water being applied to the crops.

The design of this system is such that the sprinklers located near the pivot tend to cover a smaller area in comparison to the nozzles located at the end of the pivot. Research has revealed that a pivot system is one of the most efficient methods of irrigating farmlands. It allows farmers to cover numerous acres of land in a relatively small span of time, and it can also be used to apply pesticides and fertilizers to the crops with equal efficiency.

Additionally, this system only relies on a single piece of machinery to be able to execute on numerous important elements of farming

The Advantages of a Centre Pivot Irrigation System

The following are some of the major advantages of a centre pivot irrigation system:

Uniform Application of Water

The manner in which a centre pivot system is designed helps in the uniform application of water across large sections of farmlands.

Reducing Dependency on Labour

As the centre pivot system allows farmers to execute on various farming practices with a single machine, it greatly reduces the dependency on labour across the harvest season. Farming is seen as an unreliable sector and maintaining labour forces in this industry can be challenging to many farmers. The use of technology such as centre pivot irrigation systems help to reduce the stress on farmers caused by the inconsistency in the availability of labour.

Saving Resources

It is possible to operate the mechanism of centre pivot irrigation at lower pressures as per the requirement of the farmers. This helps to conserve enormous amounts of energy in the long run. Additionally, this method of irrigation is also known to be far more efficient when it comes to the utilization of water. It helps to prevent water runoff and ensures that the water bills incurred by farmers is greatly reduced.

Additionally, using this system also makes it easier for farmers to manage the water levels in their soil. The semi-automatic nature of this mechanism, coupled with the lateral movement of the sprinklers makes managing water levels easier for farmers. It is seen that the efficiency of water application in centre pivot irrigation is nearly 80%, and this is far higher than traditional methods.

Possibility of Automation

Modern centre pivot irrigation systems also come with a timer feature that allows farmers to apply water in their farms at any time of the day or night. This can be executed without the farmers even leaving their homes. The advantage of automating this element of farming is enormous and it helps save farmers a lot of time and effort.

Versatile System

It is possible to utilize the centre pivot system to nourish nearly all types of crops. This includes fruit trees, vegetables, and arable crops. Thus it makes sense for farmers growing multiple types of crops across the year to rely on this system of irrigation. (Centre Pivot Irrigation: Improving Water Distribution to Crops; <https://stories.pinduoduo-global.com/agritech-hub/center-pivot-irrigation.>)”

In South Africa 6 282 000 people are employed in the agricultural sector, including farm employees and domestic workers. This contributes to over 12% of the South African population employed in the South African agricultural sector. The proposed development will contribute to creating employment in this sector as well as contributes to food security in South Africa.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

8.2.2. AIR QUALITY

Agricultural emissions derive from both area and point sources. Agricultural emissions play an important role in several atmospherically mediated processes of environmental and public health concerns. These atmospheric processes affect local and regional environmental quality, including odour, particulate matter (PM) exposure, eutrophication, acidification, exposure to toxics, climate, and pathogens. Agricultural emissions also contribute to the global problems caused by greenhouse gas emissions. Agricultural emissions are variable in space and time and in how they interact within the various processes and media affected. Most important factors are ammonia (where agriculture accounts for ~90% of total emissions), reduced sulphur (unquantified), PM_{2.5} (~16%), PM₁₀ (~18%), methane (~29%), nitrous oxide (~72%), and odour and emissions of pathogens (both unquantified). Agriculture also consumes fossil fuels for fertilizer production and farm operations, thus emitting carbon dioxide (CO₂), oxides of nitrogen (NO_x), sulphur oxides (SO_x), and particulates.

The world's population has grown from ~1.5 billion at the beginning of the 20th century to ~6.8 billion today. This population increase has been accompanied by the advent and growth of "intensive" agriculture, with associated impacts on the environment (1). During the next 50 years, the Earth's human population is predicted to increase to more than 9 billion, creating higher demand for agricultural commodities, both crop and animal.

Agronomists throughout the world have sought to increase food production by increasing productivity. Farmers increased agricultural output significantly between the 1940s and the 1990s, capitalizing on increased availability of nitrogen fertilizer (the global production of fertilizer currently is more than 90 Tg of N yr⁻¹, compared to ~1 Tg only 50 years ago) (7, 8). Increased agricultural output is also the result of mechanization combined with the abandonment of traditional practices, better pesticides, cultivation of marginal land, availability of hybrid and genetically modified crop varieties, and improvements in production efficiency. Many of these innovations have been supported by public investment. Furthermore, inexpensive fossil fuels have been available for fertilizer production, for replacement of human labour by increased mechanization, and for transport of raw material and products. (Viney et al, 2009).

Animal Feeding Operations can affect air quality through emissions of gases (ammonia and hydrogen sulphide), particulate matter (PM), volatile organic compounds (VOC), hazardous air pollutants, microorganisms, and odour. Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. The generation rates of odour, manure, gases, particulates, and other constituents vary with weather, time, animal species, type of housing, manure handling system, feed type, and management system (storage, handling, and stabilization).

The extent and toxicity of emissions is not necessarily a concise indicator of contributions to ground-level air pollution concentrations or of risks to health and the environment. Such contributions are also a function of the height of emission, temporal variations in the release of pollutants, and the proximity of the source to the people or the environment affected by exposure to the pollutant (such as, for instance, children, or the elderly, or people who are ill, or others who may be particularly sensitive receptors to a specific pollutant above a certain concentration). If an industry is operating close to a school or hospital or centre for the elderly, the potential exposure (in combination with the other contributing factors) is high.

Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means

paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.

Approaches adopted or considered for future implementation have included: regulation (for example, the use of Atmospheric Emission Licences for Listed Activities); market instruments (such as atmospheric user-charges and pollution taxes); the potential for voluntary agreements, education and awareness raising; and emissions trading. International experience shows that adopting a mix of instruments and interventions is more effective than using a single instrument to improve air quality across various types of source. Although direct regulation remains important in controlling industrial sources, there is evidence that specifying emission limits is more effective than specifying the use of particular technologies, so as to give companies flexibility in selecting the method of achieving success that suits them best. This approach is advocated as being more cost-effective and more likely to stimulate technological advances in pollution control methods and production processes.

For large point sources (that is, sources of pollution that are concentrated on one site, but that have large, constant volumes of many types of pollution) that are few in number, instruments such as emissions trading have been advocated as an effective way to manage pollutant emissions and reduce the costs of compliance.

https://www.environment.gov.za/sites/default/files/docs/stateofair_airqualityand_sustainable_development.pdf Date visited: 17/03/2020.

According to the AccuWeather website, the average Air Quality for this part of the North West Province is considered to be "Excellent". As mentioned above, a certain amount of Air pollution will inevitably result. This will include both cumulative and direct impacts. In addition to the above, it should be noted that the project will however create a certain amount of dust during the construction and operational phases. If proper dust suppression and soil protection measures are implemented this variable will have very little impact.

8.2.3. NOISE

It is a fact that a certain amount of noise will be generated during the construction and operational phases of the project. Noise levels should however rarely exceed the allowable limits. The chicken houses is also located more than 500 meters away from the nearest neighbour and will thus not have a negative impact on them.

8.2.4. ARCHAEOLOGY AND CULTURAL SITES

Background research indicates that there are some cultural heritage sites and features in the larger geographical area within which the study area falls. No cultural heritage (archaeological and/or historical) sites, features or material were identified in the areas that are earmarked for the clearance of indigenous vegetation for the development of the center pivots. These areas have been impacted by recent historical agricultural activities (ploughing/crop growing) and if any cultural resources did occur here in the past it would have been extensively disturbed or destroyed as a result.

A recent informal graveyard containing a number of graves of farm workers are located on the farm in the general study area. Most of these graves are stone-packed without formal headstones, although some have small inscribed stones or metal plaques. See Photograph 19. The graves seem to date from the 1970's to more recent (early 2000's). The site and graves on it will not be directly impacted by the proposed development activities, but as graves always carry a High Significance Rating in terms of Cultural Heritage care should be taken to not impact on the site and graves in any way. The graveyard has been fenced-in already with access provided to descendants to enable them to visit.



Photograph 15: A view of the graveyard

8.2.5 AESTHETICS

Visual Intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

High visual intrusion – results in a noticeable change or is discordant with the surroundings;

Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;

Low visual intrusion – minimal change or blends in well with the surroundings.

The development will change the scenic resources of the local area from an undeveloped, vegetated site to arable lands and agricultural buildings. The visual intrusion is considered to be medium as the uses will partially fit into the agricultural surroundings whilst the chicken broilers will be clearly noticeable, however not out of place in this setting.

9. ENVIRONMENTAL IMPACT ASSESSMENT

9.1 ASSESSMENT CRITERIA

Impacts were rated using the following methodology:

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Duration (time scale)	Short term	Up to 5 years
	Medium term	6 – 15 years
	Long term	More than 15 years
Extent (area)	Local	Confined to study area and its immediate surroundings
	Regional	Region (cadastral, catchment, topographic)
	National	Nationally (The country)
	International	Neighboring countries and the rest of the world.
Magnitude (Intensity)	Low	Site-specific and wider natural and/or social functions and processes are negligibly altered. ((A low intensity impact will not affect the natural, cultural, or social functions of the environment).
	Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way. (Medium scale impact will alter the different functions slightly).
	High	Site-specific and wider natural and/or social functions and processes are severely altered. (A High intensity impact will influence these functions to such an extent that it will temporarily or permanently cease to exist).
Probability	Improbable	Possibility of occurrence is very low. (Such an impact will have a very slight possibility to materialize, because of design or experience).
	Possible	There is a possibility that the impact will occur
	Probable	It is most likely that the impact will occur
	Definite	The impact will definitely occur
Significance	Insignificant	Impact is negligible and will not have an influence on the decision regarding the proposed activity (No mitigation is necessary)
	Very Low	Impact is very small and should not have any meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Low	The impact may not have a meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Medium	The impact should influence the decision regarding the proposed activity (The project can only be carried through if certain mitigatory steps are taken)
	High	The impact will influence the decision regarding the proposed activity
	Very High	The proposed activity should only be approved under special circumstances

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Reversibility	Low	There is little chance of correcting the adverse impact
	Medium	There is a moderate chance of correcting the adverse impact
	High	There is a high chance in correcting the adverse impact
Risk	Low	Assessing a risk involves an analysis of the consequences and likelihood of a hazard being realized. In decision-making, low-consequence / low-probability risks (green) are typically perceived as acceptable and therefore only require monitoring.
	Medium	Other risks (amber) may require structured risk assessment to better understand the features that contribute most to the risk. These features may be candidates for management
	High	High-consequence / high-probability risks (red) are perceived as unacceptable and a strategy is required to manage the risk.

Attributes associated with the alternatives were assessed and is outlined below:

Geographical attributes

The Geographical attributes of an area relates to the characteristics of a particular region, area or place. It influences the determination of site alternatives as it relates to the location of a site in relation to relevant features in the area.

Physical attributes

Physical attributes of an area relates to the processes and patterns in the natural environment. For the purpose of this assessment, the following processes and patterns have been investigated. Geology, soil, topography and landforms, climate and meteorology, surface water and ground water.

Biological attributes

Biological attributes for the purpose of this study includes the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area. The two main branches assessed will be:

Phytogeography is the branch of biogeography that studies the distribution of plants.

Zoogeography is the branch that studies distribution of animals.

Social attributes

Social attributes is closely related to social theory in general and sociology in particular, dealing with the relation of social phenomena and its spatial components.

Economic attributes

Economic attributes includes the location, distribution and spatial organization of economic activities and also takes into account social, cultural, and institutional factors in the spatial economy of the development.

Heritage attributes

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural attributes

Cultural attributes relates to the specific characteristics such as language, religion, ethnic and racial identity, and cultural history & traditions of people. These attributes influences family life, education, economic and political structures, and, of course, business practices.

It should be noted that the above mentioned attributes do not occur in isolation and it is not uncommon for an identified impact to overlap with two or more of these attributes. Also note, not all risks require comprehensive and detailed assessment. Solid problem formulation should allow decision-makers to evaluate the extent of subsequent analysis required. The level of effort put into assessing each risk should be proportionate to its significance and priority in relation to other risks, as well as its complexity, by reference to the likely impacts. Consideration should be given to stakeholders' perceptions of the nature of the risk.

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	Clearance of 59,7189 ha of indigenous vegetation in order to establish arable land	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Animal Feeding Operations can affect air quality through emissions of gases (ammonia and hydrogen sulphide), particulate matter (PM), volatile organic compounds (VOC), hazardous air pollutants, microorganisms, and odour. Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. The generation rates of odour, manure, gases, particulates, and other constituents vary with weather, time, animal species, type of housing, manure handling system, feed type, and management system (storage, handling, and stabilization).	Duration	Long term	Plan to ensure that the build-up of ammonia and hydrogen sulphide does not occur. This is accomplished by ensuring that the correct temperature in the houses are maintained at all times. The bedding must also stay dry. This is achieved by ensuring that water drinker system is fully functional and not leaking.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Plan to rehabilitate disturbed surfaces which can lead to erosion and dust pollution.	Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible. Spray bare surfaces with water to prevent dust pollution.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
Plan for the eradication of foreign and invader plant species which are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term	
	Extent	Local		Local	
	Magnitude (Intensity)	Low		Low	
	Probability	Definite		Definite	
	Significance	Medium		Medium	
	Reversibility	High		High	
	Risk	Low		Medium	
Plan for the provision and maintenance of ablation facilities for construction workers to prevent pollution of	Duration	Short term	Provide portable ablation facilities that will not cause pollution during the construction phase of the chicken broilers	Short term	
	Extent	Local		Local	
	Magnitude (Intensity)	Medium		Medium	

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)							
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)							
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)		
	surface and underground water.	Probability	Definite	There should be 1 Chemical toilet for every 30 workers on site.	Definite		
		Significance	Medium		Medium		
		Reversibility	High		High		
		Risk	Low		Medium		
	Plan to manage possible impacts that the project can have on the soil and geology.	Duration	Long term	Properly plan the construction phase in such a manner that impacts on the soil and geology of the area can be minimised.	Long term		
		Extent	Local		Local		
		Magnitude (Intensity)	Low		Medium		
		Probability	Definite	Plan to prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Definite		
		Significance	Medium		Medium		
		Reversibility	High		High		
		Risk	Low		Medium		
	Plan for the removal of vegetation (which will lead to the destruction of faunal and floral habitats) during the construction phase.	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants.	Short term		
		Extent	Local		Local		
		Magnitude (Intensity)	Medium		Medium		
		Probability	Definite	The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible.	Definite		
		Significance	Medium		Medium		
		Reversibility	High		High		
	Risk	Low	No snares may be set.	Medium			
	Soil pollution Leaking construction and operational vehicles may cause soil pollution. Uncontrolled use of herbicides, insecticides, pesticides and fertilizer may cause soil pollution and salinization. Salinization: Salinization of soil negatively impacts plant development and induces land degradation. Saline earths show lower agricultural productivity, worsen farmers' wellbeing, and the economic situation in the region. Salinization of soil is an excessive accumulation of water-soluble salts . Soil salinization occurs when soluble salts are retained in the earth. It happens either naturally or because of improper anthropogenic activities, particularly farming practices. Besides, some earths are initially saline due to	Duration	Permanent	Ensure that vehicles are in a good working order and not leaking oil or fuel.	Permanent		
		Extent	Local		Local		
		Magnitude (Intensity)	Medium		Medium		
		Probability	Definite	The use of herbicides, insecticides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use.	Definite		
		Significance	Medium		Medium		
		Reversibility	High		High		
		Risk	Low		Medium		
					Plan to prevent soil salinization typical methods to prevent soil salinization:		
							<ul style="list-style-type: none"> Optimize irrigation (reduce salty water usage, implement drip irrigation, use desalinated, recycled, rain-harvested water, and don't over irrigate).
							<ul style="list-style-type: none"> Add organic matter and manure to keep moisture and reduce irrigation. Refrain from deep tillage/heavy machinery not to transfer soil salts to the root zone area, which induces salinization.
<ul style="list-style-type: none"> Use cover crops or mulch to protect the ground surface. 							

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>low salt dissolution and removal. Soil salinization causes include:</p> <ul style="list-style-type: none"> • dry climates and low precipitations when excessive salts are not flushed from the earth; • high evaporation rate, which adds salts to the ground surface; • poor drainage or waterlogging when salts are not washed due to a lack of water transportation; • irrigation with salt-rich water, which amplifies salt content in earths; • removal of deep-rooted vegetation and a raised water table as a consequence; • leakage from geological deposits and penetration into groundwater; • inappropriate application of fertilizers when excess nitrification accelerates soil salinization. 				
	<p>The area lies within the drainage basin of the Groot Marico River. The Groot Marico River, that feeds the Marico Bosveld Dam, starts at the Eye of the Marico that is water originating from a Dolomitic aquifer</p> <p>The study area itself is located on an area that is drained by overland flow. No streamlines are found on the proposed site.</p> <p>Pollution of surface water and groundwater as a result of leaking construction and operational vehicles.</p> <p>Uncontrolled use of herbicides, pesticides and fertilizer may cause water pollution.</p>	Duration	Permanent	Ensure that vehicles are in a good working order and not leaking oil or fuel.	Permanent
		Duration	Short term		
		Extent	Local	The use of herbicides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use	Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
		Extent	Local		Local

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	Plan and compile method statements to implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil. Plan to provide method statements on the handling of waste materials such as glass, plastic, metal or paper which may present a possible pollution hazard	Magnitude (Intensity)	Low	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low	Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. Implement the management plan to ensure that: All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase. All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area.	Medium
Plan to control nuisance to neighbours resulting from malodours and pests (including flies)	Risk	Low	The chickens' diet will have to be formulated to prevent malodours.	Medium	
	Extent	Local		Local	
	Magnitude (Intensity)	Low		Low	
	Probability	Probable		Probable	
	Significance	Medium		Medium	
	Reversibility	High		High	
	Risk	Low		Medium	
Indirect impacts:					
Geographical Physical Social Economic	Plan and compile method statements to implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil. Plan to ensure all involved is aware of the possible social and environmental problems that may be experienced as a result of non- compliance to the relevant legislation. Plan to provide method statements on the handling of waste materials such as glass, plastic, metal or paper which may present a possible pollution hazard Plan to create new employment opportunities.	Magnitude (Intensity)	Low	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low	Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act.	Medium
		Extent	Local	All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase.	Local
		Magnitude (Intensity)	Medium		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	Plan to use local labour to ensure local skills development will take place.			All cement is housed as to prevent spills (due to rain and or handling errors). NO glass, plastic, metal, or paper shall be allowed to pollute the area. No mitigation measures needed apart from the fact that contractors will have to ensure that they abide to the requirements of the Occupational Health and Safety Act and the Employment Equity Act.	
	Plan and compile method statements to implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil. Plan to ensure all involved is aware of the possible social and environmental problems that may be experienced as a result of non-compliance to the relevant legislation.	Probability	Probable	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.	Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
		Extent	Local		Local
		Magnitude (Intensity)	Medium	Medium	
				Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act. Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines). Ensure that contractors (construction phase) abide by all the requirements of the Occupational Health and Safety Act. Ensure that all contractors are aware of the consequences of non-compliance to the relevant legislation regarding the above-mentioned act as well as with regard to the environment (acts, regulations, and special guidelines).	Medium
Cumulative impacts:					
Air quality	Agricultural emissions derive from both area and point sources. Agricultural emissions play an important role in several atmospherically mediated processes of environmental and public health concerns. These atmospheric processes affect local and regional environmental quality, including odour, particulate matter (PM) exposure, eutrophication, acidification, exposure to	Duration	Long term	Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure	Long term
		Extent	Local		Regional
		Magnitude (Intensity)	Medium		Medium
		Probability	Possible		Definite
		Significance	Low		Low
		Reversibility	High		High
		Risk	Low		Medium
		Duration	Long term		Long term
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>toxics, climate, and pathogens. Agricultural emissions also contribute to the global problems caused by greenhouse gas emissions. Agricultural emissions are variable in space and time and in how they interact within the various processes and media affected. Most important factors are ammonia (where agriculture accounts for ~90% of total emissions), reduced sulphur (unquantified), PM2.5 (~16%), PM10 (~18%), methane (~29%), nitrous oxide (~72%), and odour and emissions of pathogens (both unquantified). Agriculture also consumes fossil fuels for fertilizer production and farm operations, thus emitting carbon dioxide (CO2), oxides of nitrogen (NOx), sulphur oxides (SOx), and particulates.</p> <p>In addition to the above, it should be noted that the project will however create a certain amount of dust during the operational phase.</p>	Significance	High	<p>that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.</p> <p>According to the AccuWeather website, the average Air Quality for this part of the North West Province is considered to be "Excellent". As mentioned above, a certain amount of Air pollution will inevitably result from the development. This will include both cumulative and direct impacts.</p> <p>If proper dust suppression and soil protection measures are implemented this variable will have very little impact</p>	High
		Reversibility	High		High
		Risk	Low		Medium
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 2: Arable land under flood irrigation					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	Clearance of 59,7189 ha of indigenous vegetation in order to establish arable land	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite	Conduct a Fauna and Flora Habitat survey to determine the sensitivity of the area.	Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low	Medium	
	Soil pollution Uncontrolled use of herbicides, insecticides, pesticides and fertilizer may cause soil pollution and salinization.	Duration	Permanent	Implement the mitigation measures as described in the Environmental Management Plan.	Permanent
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
Probability		Definite	Definite		
				The use of herbicides, insecticides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use.	

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 2: Arable land under flood irrigation					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>Salinization: Salinization of soil negatively impacts plant development and induces land degradation. Saline earths show lower agricultural productivity, worsen farmers' wellbeing, and the economic situation in the region.</p> <p>Salinization of soil is an excessive accumulation of water-soluble salts.</p> <p>Soil salinization occurs when soluble salts are retained in the earth. It happens either naturally or because of improper anthropogenic activities, particularly farming practices. Besides, some earths are initially saline due to low salt dissolution and removal. Soil salinization causes include:</p> <ul style="list-style-type: none"> • dry climates and low precipitations when excessive salts are not flushed from the earth; • high evaporation rate, which adds salts to the ground surface; • poor drainage or waterlogging when salts are not washed due to a lack of water transportation; • irrigation with salt-rich water, which amplifies salt content in earths; • removal of deep-rooted vegetation and a raised water table as a consequence; • leakage from geological deposits and penetration into groundwater; • inappropriate application of fertilizers when excess nitrification accelerates soil salinization. 	Significance	Medium	<p>Plan to prevent soil salinization typical methods to prevent soil salinization:</p> <ul style="list-style-type: none"> • Optimize irrigation (reduce salty water usage, implement drip irrigation, use desalinated, recycled, rain-harvested water, and don't over irrigate). • Add organic matter and manure to keep moisture and reduce irrigation. • Refrain from deep tillage/heavy machinery not to transfer soil salts to the root zone area, which induces salinization. • Use cover crops or mulch to protect the ground surface. 	Medium
		Reversibility	High		High
		Risk	Low		Medium
	The area lies within the drainage basin of the Groot	Duration	Permanent	The use of herbicides, pesticides and fertilizer must be in accordance to	Permanent
		Duration	Short term		Short term

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)

ALTERNATIVE 2: Arable land under flood irrigation

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>Marico River. The Groot Marico River, that feeds the Marico Bosveld Dam, starts at the Eye of the Marico that is water originating from a Dolomitic aquifer</p> <p>The study area itself is located on an area that is drained by overland flow. No streamlines are found on the proposed site.</p> <p>Pollution of surface water and groundwater because of uncontrolled use of herbicides, pesticides and fertilizer may cause water pollution.</p>	Extent	Local	directions and instructions as per the supplier/product. Do not over use	Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	Low		High
Cumulative impacts:					
Air quality	<p>Agricultural emissions derive from both area and point sources. Agricultural emissions play an important role in several atmospherically mediated processes of environmental and public health concerns. These atmospheric processes affect local and regional environmental quality, including odour, particulate matter (PM) exposure, eutrophication, acidification, exposure to toxics, climate, and pathogens. Agricultural emissions also contribute to the global problems caused by greenhouse gas emissions. Agricultural emissions are variable in space and time and in how they interact within the various processes and media affected. Most important factors are ammonia (where agriculture accounts for ~90% of total emissions), reduced sulphur (unquantified), PM2.5 (~16%), PM10 (~18%), methane (~29%), nitrous oxide (~72%), and odour and emissions of pathogens (both unquantified). Agriculture also consumes fossil fuels for fertilizer production and farm operations, thus emitting carbon dioxide (CO2), oxides of</p>			<p>Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.</p> <p>According to the AccuWeather website, the average Air Quality for this part of the North West Province is considered to be "Excellent". As mentioned above, a certain amount of Air pollution will inevitably result from the development. This will include both cumulative and direct impacts.</p> <p>If proper dust suppression and soil protection measures are implemented this variable will have very little impact</p>	Medium
		Duration	Long term		Medium
		Magnitude (Intensity)	Medium		
		Probability	Definite		
		Significance	High		
		Reversibility	High		
		Risk	Low		
		Extent	Local		
		Magnitude (Intensity)	Low		

ENVIRONMENTAL IMPACT ASSESSMENT (Planning and design phase)					
ALTERNATIVE 2: Arable land under flood irrigation					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	nitrogen (NOx), sulphur oxides (SOx), and particulates. In addition to the above, it should be noted that the project will however create a certain amount of dust during the operational phase.				

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	Clearance of 59,7189 ha of indigenous vegetation in order to establish arable land and the development and operation of 8 Chicken broiler house	Duration	Long term	Obtain the necessary environmental authorization for the development. Implement the mitigation measures as described in the Environmental Management Plan	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Animal Feeding Operations can affect air quality through emissions of gases (ammonia and hydrogen sulphide), particulate matter (PM), volatile organic compounds (VOC), hazardous air pollutants, microorganisms, and odour. Animal Feeding Operations also produce gases (carbon dioxide and methane) that are associated with climate change. The generation rates of odour, manure, gases, particulates, and other constituents vary with weather, time, animal species, type of housing, manure handling system, feed type, and management system (storage, handling, and stabilization).	Duration	Long term	Plan to ensure that the build-up of ammonia and hydrogen sulphide does not occur. This is accomplished by ensuring that the correct temperature in the houses are maintained at all times. The bedding must also stay dry. This achieved by ensuring that water drinker system is fully functional and not leaking.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Rehabilitate disturbed surfaces which can lead to erosion and dust pollution.	Duration	Short term	Start the rehabilitation of disturbed surfaces as soon as possible. Spray bare surfaces with water to prevent dust pollution. Ensure construction of the chicken broilers take place within the designated footprint to minimise disturbances	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)

ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
		Risk	Low		Medium
	Eradicate foreign and invader plant species which are likely to invade disturbed areas.	Duration	Short term	Start the extermination of any invasive species as soon as possible and maintain the eradication programme.	Medium term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Provide and maintain ablation facilities for construction workers to prevent pollution of surface and underground water.	Duration	Short term	Provide portable ablation facilities that will not cause pollution There should be 1 Chemical toilet for every 30 workers on site.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Manage possible impacts that the project can have on the soil and geology.	Duration	Long term	Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours. Mitigation measures implemented as per the eventual EMPr	Long term
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Removal of vegetation (which will lead to the destruction of faunal and floral habitats).	Duration	Short term	Start with the rehabilitation of vegetation to minimize the negative effects of the removal of plants. The rule must be to minimize the disturbance of animal life by keeping the footprint as small as possible. No snares may be set.	Short term
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
	Soil pollution Leaking construction and operational vehicles may cause soil pollution. Uncontrolled use of herbicides, insecticides, pesticides and fertilizer may cause soil pollution and salinization. Salinization: Salinization of soil negatively impacts plant development and induces land degradation. Saline earths show lower agricultural productivity, worsen farmers' wellbeing, and the economic situation in the region.	Duration	Permanent	Ensure that vehicles are in a good working order and not leaking oil or fuel. The use of herbicides, insecticides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use. Plan to prevent soil salinization typical methods to prevent soil salinization: • Optimize irrigation (reduce salty water usage, implement drip irrigation, use desalinated, recycled, rain-harvested water, and don't over irrigate).	Permanent
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)

ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>Salinization of soil is an excessive accumulation of water-soluble salts.</p> <p>Soil salinization occurs when soluble salts are retained in the earth. It happens either naturally or because of improper anthropogenic activities, particularly farming practices. Besides, some earths are initially saline due to low salt dissolution and removal. Soil salinization causes include:</p> <ul style="list-style-type: none"> • dry climates and low precipitations when excessive salts are not flushed from the earth; • high evaporation rate, which adds salts to the ground surface; • poor drainage or waterlogging when salts are not washed due to a lack of water transportation; • irrigation with salt-rich water, which amplifies salt content in earths; • removal of deep-rooted vegetation and a raised water table as a consequence; • leakage from geological deposits and penetration into groundwater; • inappropriate application of fertilizers when excess nitrification accelerates soil salinization. 			<ul style="list-style-type: none"> • Add organic matter and manure to keep moisture and reduce irrigation. • Refrain from deep tillage/heavy machinery not to transfer soil salts to the root zone area, which induces salinization. • Use cover crops or mulch to protect the ground surface. 	
	<p>The area lies within the drainage basin of the Groot Marico River. The Groot Marico River, that feeds the Marico Bosveld Dam, starts at the Eye of the Marico that is water originating from a Dolomitic aquifer</p> <p>The study area itself is located on an area that is drained by overland flow. No streamlines are found on the proposed site.</p>	<p>Duration</p> <p>Duration</p> <p>Extent</p> <p>Magnitude (Intensity)</p> <p>Probability</p> <p>Significance</p> <p>Reversibility</p>	<p>Permanent</p> <p>Short term</p> <p>Local</p> <p>Low</p> <p>Probable</p> <p>Medium</p> <p>High</p>	<p>Ensure that vehicles are in a good working order and not leaking oil or fuel.</p> <p>The use of herbicides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use</p>	<p>Permanent</p> <p>Short term</p> <p>Local</p> <p>Low</p> <p>Probable</p> <p>Medium</p> <p>High</p>

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)

ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	<p>Pollution of surface water and groundwater as a result of leaking construction and operational vehicles.</p> <p>Uncontrolled use of herbicides, pesticides and fertilizer may cause water pollution.</p>				
	Control nuisance to neighbours resulting from malodours and pests (including flies)	Risk	Low	<p>The chickens' diet will have to be formulated to prevent malodours. Daily checks must be done to remove dead animals from the holding cages before they begin to decompose.</p> <p>As soon as the flock has been removed from the chicken house, the house and the equipment should be thoroughly cleaned and disinfected:</p> <ol style="list-style-type: none"> 1. Remove all the non-stationary equipment and residual feed from troughs, conveyors and bins 2. Remove all the manure, litter, feathers, dust, and any other organic materials 3. Wash equipment, fans, ducts, water tanks, feed bins, walls and floor 4. Monitor the effectiveness of clean up by visual examination and bacteriological analysis 5. The applicant must make use of a reputable pest control company and outbreaks of pests must be reported and dealt with by the appointed service provider. 	Medium
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium
Indirect impacts:					
Geographical Physical Social Economic	Implement measures for the prevention and or handling of spills of lubricants / oils that can take place on bare soil. Ensure handling of waste materials such as glass, plastic, metal or paper do not lead to pollution	Risk	Low	<p>Prevent spills of lubricants/oils that can take place on bare soil. This will include the use of drip trays for vehicles that are standing for more than 24 hours.</p> <p>Ensure that all construction vehicles are in good working order and not leaking oil and or fuel. Implement the management plan to ensure that:</p>	Medium
		Extent	Local		Local
		Magnitude (Intensity)	Low		Low
		Probability	Probable		Probable
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)

ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
				<p>All construction rubble is disposed of in a safe and environmentally acceptable manner. NO concrete, gravel or other rubbish will be allowed to remain on site after the construction phase.</p> <p>All cement is housed as to prevent spills (due to rain and or handling errors).</p> <p>NO glass, plastic, metal, or paper shall be allowed to pollute the area.</p>	
Cumulative impacts:					
Air quality	<p>Agricultural emissions derive from both area and point sources. Agricultural emissions play an important role in several atmospherically mediated processes of environmental and public health concerns. These atmospheric processes affect local and regional environmental quality, including odour, particulate matter (PM) exposure, eutrophication, acidification, exposure to toxics, climate, and pathogens. Agricultural emissions also contribute to the global problems caused by greenhouse gas emissions. Agricultural emissions are variable in space and time and in how they interact within the various processes and media affected. Most important factors are ammonia (where agriculture accounts for ~90% of total emissions), reduced sulphur (unquantified), PM2.5 (~16%), PM10 (~18%), methane (~29%), nitrous oxide (~72%), and odour and emissions of pathogens (both unquantified). Agriculture also consumes fossil fuels for fertilizer production and farm operations, thus emitting carbon dioxide (CO2), oxides of nitrogen (NOx), sulphur oxides (SOx), and particulates.</p> <p>In addition to the above, it should be noted that the project</p>			<p>Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.</p> <p>According to the AccuWeather website, the average Air Quality for this part of the North West Province is considered to be "Excellent". As mentioned above, a certain amount of Air pollution will inevitably result from the development. This will include both cumulative and direct impacts.</p> <p>If proper dust suppression and soil protection measures are implemented this variable will have very little impact</p>	
		Duration	Long term		Long term
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Low		Medium
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction phase and operational phase)					
ALTERNATIVE 1: 8 Chicken broilers and 3 centre pivots (Preferred Alternative)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
	will however create a certain amount of dust during the operational phase.				

ENVIRONMENTAL IMPACT ASSESSMENT (Construction and operational phase)					
ALTERNATIVE 2: Arable land under flood irrigation					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical Physical Social Economic	Clearance of 59,7189 ha of indigenous vegetation in order to establish arable land	Duration	Long term	Obtain the necessary environmental authorization for the development.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Flood irrigation uses gravity to transport water, and, since water flows downhill, it will miss a part of the field that is at a higher elevation	Duration	Long term	Level and scrape a field flat before planting, allowing water to flow evenly throughout the fields.	Long term
		Extent	Local		Local
		Magnitude (Intensity)	High		High
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Low		Low
		Risk	Low		Medium
	Soil pollution Uncontrolled use of herbicides, insecticides, pesticides and fertilizer may cause soil pollution and salinization. Salinization: Salinization of soil negatively impacts plant development and induces land degradation. Saline earths show lower agricultural productivity, worsen farmers' wellbeing, and the economic situation in the region. Salinization of soil is an excessive accumulation of water-soluble salts . Soil salinization occurs when soluble salts are retained in the earth. It happens either naturally or because of improper anthropogenic activities, particularly farming	Duration	Permanent	The use of herbicides, insecticides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use. Plan to prevent soil salinization typical methods to prevent soil salinization: <ul style="list-style-type: none"> • Optimize irrigation (reduce salty water usage, implement drip irrigation, use desalinated, recycled, rain-harvested water, and don't over irrigate). • Add organic matter and manure to keep moisture and reduce irrigation. • Refrain from deep tillage/heavy machinery not to transfer soil salts to the root zone area, which induces salinization. • Use cover crops or mulch to protect the ground surface. 	Permanent
		Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	High		High
		Risk	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT (Construction and operational phase)

ALTERNATIVE 2: Arable land under flood irrigation

Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)																					
	<p>practices. Besides, some earths are initially saline due to low salt dissolution and removal. Soil salinization causes include:</p> <ul style="list-style-type: none"> • dry climates and low precipitations when excessive salts are not flushed from the earth; • high evaporation rate, which adds salts to the ground surface; • poor drainage or waterlogging when salts are not washed due to a lack of water transportation; • irrigation with salt-rich water, which amplifies salt content in earths; • removal of deep-rooted vegetation and a raised water table as a consequence; • leakage from geological deposits and penetration into groundwater; • inappropriate application of fertilizers when excess nitrification accelerates soil salinization. 																									
	<p>The area lies within the drainage basin of the Groot Marico River. The Groot Marico River, that feeds the Marico Bosveld Dam, starts at the Eye of the Marico that is water originating from a Dolomitic aquifer</p> <p>The study area itself is located on an area that is drained by overland flow. No streamlines are found on the proposed site.</p> <p>Pollution of surface water and groundwater because of uncontrolled use of herbicides, pesticides and fertilizer may cause water pollution.</p>	<table border="1"> <tr><td>Duration</td><td>Permanent</td></tr> <tr><td>Duration</td><td>Short term</td></tr> <tr><td>Extent</td><td>Local</td></tr> <tr><td>Magnitude (Intensity)</td><td>Low</td></tr> <tr><td>Probability</td><td>Probable</td></tr> <tr><td>Significance</td><td>Medium</td></tr> <tr><td>Reversibility</td><td>Low</td></tr> </table>	Duration	Permanent	Duration	Short term	Extent	Local	Magnitude (Intensity)	Low	Probability	Probable	Significance	Medium	Reversibility	Low		The use of herbicides, pesticides and fertilizer must be in accordance to directions and instructions as per the supplier/product. Do not over use	<table border="1"> <tr><td>Permanent</td></tr> <tr><td>Short term</td></tr> <tr><td>Local</td></tr> <tr><td>Low</td></tr> <tr><td>Probable</td></tr> <tr><td>Medium</td></tr> <tr><td>High</td></tr> </table>	Permanent	Short term	Local	Low	Probable	Medium	High
Duration	Permanent																									
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Extent	Local																									
Magnitude (Intensity)	Low																									
Probability	Probable																									
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Permanent																										
Short term																										
Local																										
Low																										
Probable																										
Medium																										
High																										
Cumulative impacts:																										

ENVIRONMENTAL IMPACT ASSESSMENT (Construction and operational phase)					
ALTERNATIVE 2: Arable land under flood irrigation					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
Air quality	<p>Agricultural emissions derive from both area and point sources. Agricultural emissions play an important role in several atmospherically mediated processes of environmental and public health concerns. These atmospheric processes affect local and regional environmental quality, including odour, particulate matter (PM) exposure, eutrophication, acidification, exposure to toxics, climate, and pathogens. Agricultural emissions also contribute to the global problems caused by greenhouse gas emissions. Agricultural emissions are variable in space and time and in how they interact within the various processes and media affected. Most important factors are ammonia (where agriculture accounts for ~90% of total emissions), reduced sulphur (unquantified), PM2.5 (~16%), PM10 (~18%), methane (~29%), nitrous oxide (~72%), and odour and emissions of pathogens (both unquantified). Agriculture also consumes fossil fuels for fertilizer production and farm operations, thus emitting carbon dioxide (CO₂), oxides of nitrogen (NO_x), sulphur oxides (SO_x), and particulates.</p> <p>In addition to the above, it should be noted that the project will however create a certain amount of dust during the operational phase.</p>			<p>Historically, air pollution control in South Africa has primarily emphasized the implementation of 'command and control' measures in the industrial sector. The shift from source-based control, to the management of the air that people breathe, emphasizes the importance of targeting a wider range of sources and using more flexible and varied approaches. It means paying greater attention to ambient air quality, as it is more important (and more cost-effective, in many cases) to make sure that the ambient air complies with air quality standards. This approach ensures that human and environmental health is protected and that the cumulative impact of pollution from a number of sources is addressed.</p> <p>According to the AccuWeather website, the average Air Quality for this part of the North West Province is considered to be "Excellent". As mentioned above, a certain amount of Air pollution will inevitably result from the development. This will include both cumulative and direct impacts.</p> <p>If proper dust suppression and soil protection measures are implemented this variable will have very little impact</p>	Medium
		Duration	Long term		Definite
		Magnitude (Intensity)	Medium		High
		Probability	Definite		High
		Significance	High		High
		Reversibility	High		Medium
		Risk	Low		Local
		Extent	Local		Local
		Magnitude (Intensity)	Low		Medium

ENVIRONMENTAL IMPACT ASSESSMENT					
ALTERNATIVE 3: (No-Go Option)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
DIRECT IMPACTS:					
Geographical		Duration	Long term	No mitigation measures required.	Long term

ENVIRONMENTAL IMPACT ASSESSMENT					
ALTERNATIVE 3: (No-Go Option)					
Environmental Attribute	Potential impacts and risks	Assessment criteria	Assessment rating (With mitigation)	Proposed mitigation	Assessment rating (Without mitigation)
Physical Social Economic Cultural	No indigenous vegetation will be removed.	Extent	Local		Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	Low		Low
		Risk	Medium		Medium
Indirect impacts:					
Geographical Physical Social Economic Cultural	No new employment opportunities will be created No skills enhancement will take place If this option is implemented, the projected boost to the local and regional economy will not take place.	Extent	Local	Ensure that the fields and chicken broilers are levelled/ constructed and operated as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	Medium		Medium
		Reversibility	Medium		Medium
		Risk	High		High
Cumulative impacts:					
Geographical Physical Social Economic Cultural	If this option is implemented, the projected boost to the local and regional economy will not take place. No new employment opportunities will be created. No improvement to local skills development will take place.	Extent	Local	Ensure that the fields and chicken houses are constructed and operated / irrigated as planned.	Local
		Magnitude (Intensity)	Medium		Medium
		Probability	Definite		Definite
		Significance	High		High
		Reversibility	High		High
		Risk	Medium		Medium

10. PUBLIC PARTICIPATION.

10.1 ADVERTISEMENT AND NOTICE

Publication name	Rustenburg Herald	
Date published	29/04/2022	
Site notice 1 position	Latitude	Longitude
	25°26'43.68"S	26°23'17.18"E
Date placed	28/04/2022	

PROOF OF SITE NOTICE

To follow

TO FOLLOW

10.2 DETERMINATION OF APPROPRIATE MEASURES

Details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN R.982.

Key stakeholders (other than organs of state) identified in terms of Regulation 40(2)(d) of GN R.982:

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
[Redacted content]		

10.3 AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders. Key stakeholders identified in terms of Regulation 7(1) and (2) and Regulation 40(2) (a)-(c) of GN R.982:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address
Department of Water and Sanitation	Ms. C. Theunissen	(012) 253-1026			Crocodile (West) Marico WRM DWS - Hartbeespoort Dam; P / Bag X 352 Hartbeespoort; 0216
Marico Bosveld GWS	Mr. Mokgau Pogiso	082 895 0609		mokgau@dws.gov.za	
Marico Biosphere Reserve	The Secretary	079 839 9167		Moi.marico@gmail.com	P.O. Box 295; Groot Marico; 2850
Head of Department: North-West Department of Agriculture and Rural Development	Dr. P. Mokaila	(018) 389 5146/5104	(018) 392 4377		Department Agriculture and Rural Development Private Bag X2039 Mmabatho 2735
North West Department of Biodiversity	Head of Department:	018 389 5719/5431/5688	018 392 4377	DSeshabela@nwpg.gov.za	Private Bag X2039 Mmabatho 2735
Ngaka Modiri Molema District Municipality	The District Municipal Manager	018 381 9400	018 381 0561		Private Bag X2167, Mahikeng, 2745
Ramotshere Moiloa Local Municipality	The Municipal Manager	018 642 1081	018 642 2618		PO Box 92; Zeerust; 2865
Ward 17, Ramotshere Moiloa Local Municipality	The Councilor	018 642 1081	018 642 2618		PO Box 92; Zeerust; 2865
SAHRA				SAHRIS	



AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

7 Louis Leipoldt Street,
Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

29/04/2022

Department of water and Sanitation: Cornia Theunissen
Chief Administration Clerk
Crocodile (West) Marico WRM - Hartbeespoort Dam
Old Rustenburg Road
Hartbeespoort
0216

Office: 087-943-3741
Cell: 082-889-7930

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

AB ENVIRO CONSULT was appointed by **Gronum Loots Familie Trust** to submit an application to the North West Department Economic Development, Environment, Conservation and Tourism for the above mentioned development.

Please find enclosed an electronic copy of the Scoping Report. We must receive your comments by no later than the 31st of May 2022. In the event of your organisation/department not wishing to comment on this matter, it would be appreciated if we could receive written confirmation thereof to enable us to continue with the finalisation of the application. If no response is however received from your Department/organisation within the said time, it will be assumed that your department/organisation does not wish to comment on this matter and the application will be processed further. Please be advised, in accordance with POPIA and NEMA, personal data is collected and processed by the applicant/EAP and shared with the Competent Authority to enable informed decision-making.

Please do not hesitate to contact us should any further information or clarification be required.

Yours sincerely,

Mr JP de Villiers
EAP-EAPASA: 2019/808

PROF A B DE VILLIERS (M Sc, Ph D, SACNASP)

MR.J.P. DE VILLIERS (M Sc, HED, EAP-EAPASA); MRS.J.E. DU PLOOY (M.E.M: EAP-EAPASA)



7 Louis Leipoldt Street,
Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

29/04/2022

Dr. P. Mokaila
Head of Department: North-West Department of Agriculture and Rural Development
Private Bag X2039
Mmabatho
2735

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land. (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

29/04/2022

The Manager
Directorate: Biodiversity Management and Conservation
North West Department: North West Department Economic Development, Environment, Conservation and Tourism
DSeshabela@nwpg.gov.za

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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Please do not hesitate to contact us should any further information or clarification be required.

Yours sincerely,

Mr JP de Villiers
EAP-EAPASA: 2019/808

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MR.J.P. DE VILLIERS (M Sc, HED, EAP-EAPASA); MRS.J.E. DU PLOOY (M.E.M; EAP-EAPASA)



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Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

29/04/2022

The Acting District Municipal Manager:
Loax Aphupholopswe Gopane
Ngaka Modiri Molema District Municipality
Private Bag X2167
Mahikeng
2745

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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Please do not hesitate to contact us should any further information or clarification be required.

Yours sincerely,

Mr JP de Villiers
EAP-EAPASA: 2019/808

PROF A B DE VILLIERS (M Sc, Ph D, SACNASP)
MR.J.P. DE VILLIERS (M Sc, HED, EAP-EAPASA); MRS.J.E. DU PLOOY (M.E.M; EAP-EAPASA)



7 Louis Leipoldt Street,
Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

29/04/2022

The Municipal Manager
Ramotshere Moiloa Local Municipality
PO Box 92
Zeerust
2865

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land. (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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Reg no. 2000/016653/23

7 Louis Leipoldt Street,
Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

29/04/2022

The Councillor Ward 17
Clr. Dingaen Abislon Seakentoa
Ramotshere Moiloa Local Municipality
PO Box 92
Zeerust
2865

Dear Sir/Madam

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AB ENVIRO-CONSULT CC

Reg no. 2000/016653/23

7 Louis Leipoldt Street,
Pretoria, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

29/04/2022

Marico Bosveld GWS
Mr. Mokgau Pogiso
mokgaup@dws.gov.za

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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Potchefstroom, 2531
Fax: + 27 (18) 293 0671
Cell: + 27 (83) 5488 105
jp@abenviro.co.za

29/04/2022

**Marico Biosphere Reserve
The Secretary
P.O. Box 295
Groot Marico
2850**

Dear Sir/Madam

Environmental Impact Assessment for the proposed clearance of 59,7189 ha of indigenous vegetation in order to establish arable land, (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses for the concentration of 520 000 broiler chickens located on Portion 62, of the Farm Riekersdam 109 JP, Groot Marico, Ramotshere Moiloa Local Municipality, North West Province

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10.4 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
To Follow	

10.5 COMMENTS AND RESPONSE REPORT

I&AP registered:	Comment received:	Response by the EAP:

11. CONCLUDING STATEMENT.

Both the proposed development of centre pivots and chicken broilers are in line with national and provincial priorities. The South African commercial poultry industry is the single largest contributor to agricultural related GDP, and an exemplar of the country's commercial livestock sector, with its production systems and efficiency comparable with other global intensive production systems (DAFF, 2018). Section 5 of the North West SDF, Provincial priority area 3 states: “agriculture production need to be expanded, with emphasis on well-supported small-scale farming, communal farmers, commercial farmers and cooperatives. The provincial objectives are:

- 35 734 direct jobs must be created through the agriculture, agro-processing and related sectors by 2030.
- Maintain a positive trade balance for primary and processed agricultural products.
- Agriculture must maintain an average growth rate of 8.5 per cent between now and 2030. Against this growth rate, the Gross Value Added (GVA) contribution of the sector will increase from R 3.39 million to R 17.31 million in 2030 (2010 R-values).
- The sectoral Gross Value Added (GVA) contribution of agriculture will expand from 2.3 per cent in 2010 to 4.1 per cent in 2030 (Actions: Agriculture Development: Expand commercial agriculture”)

Specifically in relation to irrigated land; according to Dr Damien Jourdain, researcher at CIRAD (Agricultural Research for Development) 65% of South Africa’s territory receives less than 500mm/y in average annual rainfall which is the limit for successful ‘dryland cultivation of crops’. Agriculture and Irrigation represent 61% of South Africa’s water demand (in line with global average). Municipal and domestic use of water represents 27% of the water usage. This figure is high to due to a lot of waste in the systems. Irrigation is very important to the agricultural sector as it accounts for 30% of the country’s crops. The agricultural and agro-industrial sectors contribute to a combined 15% of the GDP and are key to the food industry and job creation opportunities. 98% of the available water is already allocated and this puts pressure on the ‘ecological reserve’ which is the minimum amount of water necessary to keep the ecosystem functional. With population increase and need to feed this increasing population, with no doubt, demand will grow up in the future. Risks of shortfall are high and already taking place in some places (e.g., Cape Town 2018). Yet SA Government targets an increase of irrigated areas by 50% (NDP’s Vision 2030).

“Rain-fed agriculture sustains 60% of global food production. Rain-fed cropping systems are highly dependent on climatic conditions and vulnerable to changes in precipitation and temperature patterns, which are intensifying as a result of global warming. Climate change is expected to alter rainfall patterns and exacerbate water- and heat-stress events over rain-fed croplands. Irrigation expansion over water-stressed rain-fed croplands is an effective agricultural adaptation measure in response to climate change. Irrigated cropping systems, which use both rainwater (“green water”) and surface water and/or groundwater (or “blue water”), contribute to a more reliable and resilient crop production while boosting agricultural productivity. In fact, the use of irrigation enables reliable water supply and can also alleviate crop’s heat stress, highlighting how important irrigation is to food-producing regions that will be affected by climate change”. (Roza, 2020)

“Centre pivot irrigation refers to the use of a mechanised irrigation system that can help to irrigate crops by maintaining a circular pattern around a central pivot. It largely consists of a lengthy radial pipe that is supported by sprinkling towers. These towers pivot around a centre point of the whole mechanism.

The radial pipe itself consists of equally spaced nozzles in order to supply water to the surrounding crops. As the pipe gradually rotates, the water is uniformly released from the nozzles in order to offer nutrition to the crops.

By using the radial pipe system of centre pivot irrigation, water is made to travel along a straight line down the field. All the nozzles of the pipe have the same flow rate and are made to cover the same area as well. This helps to greatly boost the uniformity of the water being applied to the crops. The design of this system is such that the sprinklers located near the pivot tend to cover a smaller area in comparison to the nozzles located at the end of the pivot. Research has revealed that a pivot system is one of the most efficient methods of irrigating farmlands. It allows farmers to cover numerous acres of land in a relatively small span of time, and it can also be used to apply pesticides and fertilizers to the crops with equal efficiency.

Additionally, this system only relies on a single piece of machinery to be able to execute on numerous important elements of farming

The Advantages of a Centre Pivot Irrigation System

The following are some of the major advantages of a centre pivot irrigation system:

Uniform Application of Water

The manner in which a centre pivot system is designed helps in the uniform application of water across large sections of farmlands.

Reducing Dependency on Labour

As the centre pivot system allows farmers to execute on various farming practices with a single machine, it greatly reduces the dependency on labour across the harvest season. Farming is seen as an unreliable sector and maintaining labour forces in this industry can be challenging to many farmers. The use of technology such as centre pivot irrigation systems help to reduce the stress on farmers caused by the inconsistency in the availability of labour.

Saving Resources

It is possible to operate the mechanism of centre pivot irrigation at lower pressures as per the requirement of the farmers. This helps to conserve enormous amounts of energy in the long run. Additionally, this method of irrigation is also known to be far more efficient when it comes to the utilization of water. It helps to prevent water runoff and ensures that the water bills incurred by farmers is greatly reduced.

Additionally, using this system also makes it easier for farmers to manage the water levels in their soil. The semi-automatic nature of this mechanism, coupled with the lateral movement of the sprinklers makes managing water levels easier for farmers. It is seen that the efficiency of water application in centre pivot irrigation is nearly 80%, and this is far higher than traditional methods.

Possibility of Automation

Modern centre pivot irrigation systems also come with a timer feature that allows farmers to apply water in their farms at any time of the day or night. This can be executed without the farmers even leaving their homes. The advantage of automating this element of farming is enormous and it helps save farmers a lot of time and effort.

Versatile System

It is possible to utilize the centre pivot system to nourish nearly all types of crops. This includes fruit trees, vegetables, and arable crops. Thus it makes sense for farmers growing multiple types of crops across the year to rely on this system of irrigation. (**Centre Pivot Irrigation: Improving Water Distribution to Crops;** <https://stories.pinduoduo-global.com/agritech-hub/center-pivot-irrigation.>)”

In South Africa 6 282 000 people are employed in the agricultural sector, including farm employees and domestic workers. This contributes to over 12% of the South African population employed in the South African agricultural sector. The proposed development will contribute to creating employment in this sector as well as contributes to food security in South Africa.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to economic spin-offs that will result.

12 PLAN OF STUDY FOR EIA

12.1 Description of the alternatives to be considered and assessed

One of the objectives of an EIA is to investigate alternatives to the proposed project. The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. In order to ensure that the proposed development enables sustainable development, feasible alternatives must be explored (S. Cliff, 2015).

The identification, description, evaluation and comparison of alternatives are important for ensuring a sound environmental scoping process. Alternatives should be considered as a norm within the Environmental Process (S. Cliff, 2015).

The alternatives considered for the proposed development includes land use alternatives (including the No-go option). The various alternatives will be assessed in the EIAR, in terms of environmental, social and technical feasibility.

12.1 Land Use / technology alternatives

Preferred alternative: To establish arable land (consisting of three fields to be irrigated by means of center pivots) and the development and related operation of 8 Chicken Broiler houses.

Alternative 1: To establish arable land on all areas (no chicken broilers) which will then be irrigated by means of flood irrigation.

Alternative 2: “No-go” alternative

12.1.1 The use of Centre pivots as means of irrigation and establishing 8 chicken broiler houses

According to: Frontiers in sustainable food systems: “The South African Commercial poultry (broiler and layer) industry is the single largest contributor to agricultural related Gross Domestic Product and an exemplar of the country’s commercial livestock sector. Broiler meat remains the most affordable meat option and plays an important role in household food and nutrition in South African food system. Furthermore, broiler meat is regarded by some as the least environmentally damaging meat option as intensive production has limited the direct impacts on land use” <https://www.frontiersin.org/articles/10.3389/fsufs.2021.650469/full> (visited 22/04/2022).

As such, the chicken broilers proposed will contribute to SA’s food security as well as being regarded as environmentally the least damaging meat option in SA’s commercial livestock sector. Thereby making this land use on the area proposed the preferred alternative.

Considering alternative watering methods in relation to the 3 areas to be irrigated, it is important to understand the preferred method of irrigation: A centre-pivot irrigation system consists of a fixed, pivot structure with a long pipeline to which sprinklers are attached for dispersing water. The pipeline rotates around the central pivot in a straight radial-arm fashion, riding on wheeled tower structures and creating a large irrigated circle pattern on planted crops.

The main pipe is connected to a pumping station that pumps water from a source. The water flows to the central tower from where it is distributed to the sprinklers. In order for the irrigation to be uniform, the discharge of sprinklers closer to the central tower is lower than the discharge of sprinklers located at a larger distance.

The control panel enables the operator to set when to start and stop watering, as well as the direction in which the machine moves. Therefore, depending on the type and capabilities of the control panel used, the system can be operated either manually or automatically.

The components of the centre pivot irrigation system

Pivot point – A central tower, around which the whole system revolves. It is connected to a fixed water supply. The central tower can be either fixed or movable (on wheels).

Pipeline – A long irrigation line, consisting of a series of lateral pipes. The pipe is supported by the drive towers.

Drive towers – The main pipe, on which the emitters are mounted, is supported over the ground by wheeled towers.

Span – The water pipe between drive towers.

Water emitters – Sprinklers, sprayers or bubblers that are mounted on the pipeline at a spacing that allows for high irrigation uniformity. They may vary in type, size and spacing along the pipeline.

Tower box – Installed on each drive tower and controls its movement.

Control panel – Located at the pivot point and used as the main operating point. Irrigation prescriptions are fed or uploaded to the control panel. The panel can often be controlled remotely via an app.

End gun – An end gun can be added to the machine. It is a large sprinkler that can deliver water to corners of the field that are not covered by the circular irrigation pattern of the pivot.

The advantages of centre pivots over other methods of irrigation includes uniform application of water to large fields, low energy consumption, relatively low cost, and the savings in labour required for irrigation. The average life of a centre pivot is more than twenty-five years of annual usage, resulting in a very low total life-time cost of ownership. Its ability to operate over undulating ground gives the additional advantage of not requiring costly land levelling, as is the case with other forms of irrigation. Chemicals can also be applied to the crop through aqueous solution with the irrigation water or by separate spray manifolds mounted on the pipeline structure. Water runoff can be virtually eliminated by the precise application of only the amount of water that can be absorbed by the soil.

There is only a limited amount of fresh water in the world, and each farmer has a limited number of days and money to invest and bring his crop to market. The reported application efficiencies for new

well designed centre pivots are generally in the 80-95% range, compared to 50-90% for surface irrigation systems.

12.1.2 To use all the land as fields (thus to not implement the option of the proposed chicken broilers) and to irrigate by means of flood irrigation (Alternative 2)

The technology alternative of making use of a flood irrigation system as a means to irrigate the fields. Since the beginning of domestic farming, ancient farmers used flood irrigation. Today, farmers still flood their fields to water their crops. It is a simple method, but one that is labour intensive, and not very efficient.

Levelling of fields: Flood irrigation uses gravity to transport water, and, since water flows downhill, it will miss a part of the field that is at a higher elevation. Farmers are using levelling equipment, to scrape a field flat before planting. This allows water to flow evenly throughout the fields.

Capture and reuse of runoff: A large amount of flood-irrigation water is wasted as it runs off at the edges and back of the fields. Farmers can capture the runoff in ponds and pump it back up to the front of the field where it is reused for the next cycle of irrigation.

In order to get the right amount of irrigation water at the end of the flood-irrigated field, the field must be over-watered at the beginning of the flood run. More water than the crop requires will soak into – and sometimes through – the soil profile at the beginning of a levelled flood field to get the desired water application at the end of the flood run.

Research performed by scientists at the University of California-Davis evaluated and compared centre pivot irrigation sprinklers to furrow flood irrigation. The conclusion was that when compared to flood/gravity irrigation practices, the precise, uniform water application provided by centre pivot irrigation sprinklers often results in higher crop yields. Combining the reduction of water use with pumping energy cost reductions, centre pivot sprinkler irrigation delivers solid economic benefits. And with increasing shortages of farm labour, the convenience of centre pivot irrigation will continue to be an effective long-term management tool for the successful modern farmer.

12.1.3 No-go Alternative

When considering the “no-go” Alternative for this development one has to consider the implication of not having developed the centre pivot cultivated fields. In the assessment of this option it is important to note that when the irrigation scheme was initially developed back in 1933 the only “technology” available for irrigation was flood irrigation as there was no electricity available in the area. Farmers were allocated water quotas that were registered against the Farms. These quotas were calculated with flood irrigation as a means of irrigation in mind and resulted in high volumes of water being allocated per hectare. Irrigation fields were only developed on the “down slope” side of the canal as gravity was the only method of water distribution.

With Electricity becoming available in the mid 1950's, alternative means of irrigation became available. New technologies has made it possible for farmers to irrigate more hectares of land with the same quota. This has resulted in the clearance of more hectares of indigenous vegetation in order to establish arable land. This process has continued since then as technology continued to improve. Some Farmers (Including the Applicant) has also bought land from their neighbours. Some

of these farms were never upgraded with modern irrigation systems and as the new owner saw the opportunity to modernise and as such more hectares of irrigation fields were developed.

According to: *Frontiers in sustainable food systems*: “The South African Commercial poultry (broiler and layer) industry is the single largest contributor to agricultural related Gross Domestic Product and an exemplar of the country’s commercial livestock sector. Broiler meat remains the most affordable meat option and plays an important role in household food and nutrition in South African food system. Furthermore, broiler meat is regarded by some as the least environmentally damaging meat option as intensive production has limited the direct impacts on land use” <https://www.frontiersin.org/articles/10.3389/fsufs.2021.650469/full> (visited 22/04/2022).

Had the “no-go” Alternative been implemented, the advantages of being able to irrigate more land, more efficiently, would not have been possible and the chicken broilers not contributing to SA’s food security. Thereby making this land use on the area proposed the preferred alternative.

12.2 Description of the aspects to be assessed as part of the environmental impact assessment process

In order to assess a proposed development it is important to take into consideration the principles of NEMA. These principles are outlined in Chapter 1 and DEDECT as follows:

- 1) *“The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—*
 - a. *shall apply alongside all other appropriate and relevant considerations, including the State’s responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;*
 - b. *serve as the general framework within which environmental management and implementation plans must be formulated;*
 - c. *serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;*
 - d. *serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and*
 - e. *guide the interpretation administration and implementation of this Act, and any other law concerned with the protection or management of the environment.*
- 2) *Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.*
- 3) *Development must be socially, environmentally and economically sustainable.*
- 4) (a) *Sustainable development requires the consideration of all relevant factors including the following:*
 - (i) *That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied:*
 - (ii) *that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;*

- (iii) *that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;*
 - (iv) *that waste is avoided. or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;*
 - (v) *that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;*
 - (vi) *that the development. use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;*
 - (vii) *that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and*
 - (viii) *that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.*
- (b) *Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.*
 - (c) *Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.*
 - (d) *Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.*
 - (e) *Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.*
 - (f) *The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation and participation by vulnerable and disadvantaged persons must be ensured.*
 - (g) *Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.*
 - (h) *Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.*
 - (i) *The social, economic and environmental impacts of activities, including disadvantages and benefits must be considered, assessed and evaluated and*

decisions must be appropriate in the light of such consideration and assessment.

- (j) The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.*
- (k) Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.*
- (l) There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.*
- (m) Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.*
- (n) Global and international responsibilities relating to the environment must be discharged in the national interest.*
- (o) The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.*
- (p) The costs of remedying pollution, environmental degradation consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.*
- (q) The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.*
- (r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure."*

The following aspects and their possible impacts will be assessed

- ❖ Geology -structure and rock-type
- ❖ Topography- macro and micro-relief
- ❖ Climate: Temperature, rainfall, and wind.
- ❖ Soil
- ❖ Fauna
- ❖ Flora
- ❖ Surface Water
- ❖ Underground water
- ❖ Air Quality
- ❖ Noise
- ❖ Archaeology
- ❖ Cultural Sites
- ❖ Aesthetics
- ❖ Technical issues
- ❖ Sociological Issues
- ❖ Economic Issues

- The evaluation of concerns in order to assign priority to the important issues: The study is designed to address concerns as well as to prioritise issues as part of the process.
- Developing a strategy for addressing and resolving each issue: All relevant issues will be addressed in order of priority. In this sense the inputs of all I&APs, as well as all other socio-economic factors of importance will be resolved in order of priority.
- Providing feedback at regular intervals in which comments by authorities have been incorporated: Feedback to I&APs is the only logical way by which eventual acceptance can be achieved. It is therefore a standing practise in all studies conducted by the consultant that feedback is provided on a continuous basis.

12.3 Aspects to be assessed by specialists

The process followed can be described as follows:

- 1) The EAP was contracted by the land owner, **Gronum Loots Familie Trust** as their Independent Environmental Assessment Practitioner.
- 2) A SAHRA Specialist has been appointed to determine the possible impact of the development / fields on Archaeological and Cultural features.
- 3) A Fauna and Flora specialist has been appointed to determine the impact of the proposed development / fields on the Fauna and Flora of the area.
- 4) An Environmental Screening Process was conducted by the EAP to ensure that all the relevant Environmental Legislation is taken into consideration.
- 5) Desk top studies were conducted and alternatives assessed.
- 6) Site inspections were carried out to verify the outcomes of the desktop studies, and the preferred alternative defined.
- 7) A full Public Participation Process is being followed to obtain inputs from interested and affected parties.
- 8) All the information obtained from the above mentioned processes is being used to assess the Environmental Impact that the proposed development may have on the Environment and vice versa.
- 9) The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP is being used to determine measures to avoid, mitigate and manage potential impacts. These measures are described in the Environmental Management Programme.

The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP will be used to determine measures to avoid, mitigate and manage potential impacts. These measures will be described in the Environmental Management Programme.

12.4 Description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists,

And

12.5 Description of the proposed method of assessing duration and significance

Impacts will be rated using the following methodology:

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Duration (time scale)	Short term	Up to 5 years

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
	Medium term	6 – 15 years
	Long term	More than 15 years
Extent (area)	Local	Confined to study area and its immediate surroundings
	Regional	Region (cadastral, catchment, topographic)
	National	Nationally (The country)
	International	Neighboring countries and the rest of the world.
Magnitude (Intensity)	Low	Site-specific and wider natural and/or social functions and processes are negligibly altered. ((A low intensity impact will not affect the natural, cultural, or social functions of the environment).
	Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way. (Medium scale impact will alter the different functions slightly).
	High	Site-specific and wider natural and/or social functions and processes are severely altered. (A High intensity impact will influence these functions to such an extent that it will temporarily or permanently cease to exist).
Probability	Improbable	Possibility of occurrence is very low. (Such an impact will have a very slight possibility to materialize, because of design or experience).
	Possible	There is a possibility that the impact will occur
	Probable	It is most likely that the impact will occur
	Definite	The impact will definitely occur
Significance	Insignificant	Impact is negligible and will not have an influence on the decision regarding the proposed activity (No mitigation is necessary)
	Very Low	Impact is very small and should not have any meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Low	The impact may not have a meaningful influence on the decision regarding the proposed activity (No mitigation is necessary)
	Medium	The impact should influence the decision regarding the proposed activity (The project can only be carried through if certain mitigatory steps are taken)
	High	The impact will influence the decision regarding the proposed activity
	Very High	The proposed activity should only be approved under special circumstances
Reversibility	Low	There is little chance of correcting the adverse impact
	Medium	There is a moderate chance of correcting the adverse impact
	High	There is a high chance in correcting the adverse impact

Nature of the potential impact		Description of the effect, and the affected aspect of the environment
Risk	Low	Assessing a risk involves an analysis of the consequences and likelihood of a hazard being realized. In decision-making, low-consequence / low-probability risks (green) are typically perceived as acceptable and therefore only require monitoring.
	Medium	Other risks (amber) may require structured risk assessment to better understand the features that contribute most to the risk. These features may be candidates for management
	High	High-consequence / high-probability risks (red) are perceived as unacceptable and a strategy is required to manage the risk.

Attributes associated with the alternatives will be assessed and is outlined below:

Geographical attributes

The Geographical attributes of an area relates to the characteristics of a particular region, area or place. It influences the determination of site alternatives as it relates to the location of a site in relation to relevant features in the area. A surveyor has been appointed to map the area and determine site levels.

Physical attributes

Physical attributes of an area relates to the processes and patterns in the natural environment. For the purpose of this assessment, the following processes and patterns have been investigated. Geology, soil, topography and landforms, climate and meteorology, surface water and ground water. Various Specialists are involved in assessing different aspects including Civil Engineer, Electrical Engineer, Surveyor, Town Planner, Botanical Specialist, Wetland Specialist, SAHRA Specialist and the EAP.

Biological attributes

Biological attributes for the purpose of this study includes the distribution of species and ecosystems in geographic space and through geological time. Organisms and biological communities often vary in a regular fashion along geographic gradients of latitude, elevation, isolation and habitat area. The two main branches assessed will be:
 Phytogeography is the branch of biogeography that studies the distribution of plants.
 Zoogeography is the branch that studies distribution of animals. The Botanical Specialist will determine the sensitivity and distribution of flora and associated fauna, and the wetland specialist will ensure that the relevant aquatic ecosystems are assessed.

Social attributes

Social attributes is closely related to social theory in general and sociology in particular, dealing with the relation of social phenomena and its spatial components. EAP, Town Planner, Civil Engineer and SAHRA specialist.

Economic attributes

Economic attributes includes the location, distribution and spatial organization of economic activities and also takes into account social, cultural, and institutional factors in the spatial economy of the development. . EAP, Town Planner, Civil Engineer and SAHRA specialist.

Heritage attributes

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of paleontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction. SAHRA Specialist.

Cultural attributes

Cultural attributes relates to the specific characteristics such as language, religion, ethnic and racial identity, and cultural history & traditions of people. These attributes influences family life, education, economic and political structures, and, of course, business practices. It should be noted that the above mentioned attributes do not occur in isolation and it is not uncommon for an identified impact to overlap with two or more of these attributes. Also note, not all risks require comprehensive and detailed assessment. Solid problem formulation should allow decision-makers to evaluate the extent of subsequent analysis required. The level of effort put into assessing each risk should be proportionate to its significance and priority in relation to other risks, as well as its complexity, by reference to the likely impacts. Consideration should be given to stakeholders' perceptions of the nature of the risk. SAHRA Specialist.

The inputs from Specialists, interested and affected parties, together with the knowledge of the EAP will be used to determine measures to avoid, mitigate and manage potential impacts. Inputs from I&APs will be considered for all the above in order to ensure a sustainable development.

12.6 Stages at which the competent authority will be consulted

- 1) The first consultation will be in the form of the application submission
- 2) The Draft Scoping report will be submitted to the Department
- 3) The final Scoping report will be submitted to the Department by upon receipt of the approval of the Draft Scoping Report.
- 4) Once the Final Scoping report has been accepted, a Draft EIA Report will be submitted to the Department.
- 5) 30 Days after this draft EIA Report has been submitted, the final EIA Report will be submitted to the Department.

12.7 Particulars of the public participation process that will be conducted during the environmental impact assessment process

Public and stakeholder involvement in the EIA process is widely recognised as being an *essential* component of the EIA process. The input and contribution added to the process, by public comment and involvement, leads to better and more acceptable decision-making. The involvement of

interested parties, adjacent land owners, NGO bodies and others, can help to identify whether all impacts have been included and whether all risk groups have been identified.

The engagement process will provide stakeholders with the opportunity to raise their issues and concerns and to interact on a one-on-one basis with the project team.

Registered I&APs shall be informed of the approval or rejection of the scoping report, and will be encouraged to continue their active participation in the EIA process by staying involved in the process, and commenting on the scoping report approval conditions / requirements.

The PPP to be conducted during the EIA phase will entail the following:

- ❖ Update the existing stakeholder database, following the review of the draft and final scoping reports by registered IAP's and DEDECT
- ❖ Announcement of the EIA phase of the project, which entails the following:
 - 1) Distribution of Letters, notices, the Draft and final EIAR to all registered I&APs via email, fax or post;
 - 2) Hosting Public Meetings (if necessary);
 - 3) Integration of comments into a Comments and Response Report;

12.8 Description of the tasks that will be undertaken as part of the environmental impact assessment process

Actions
1. Assessment Phase
1.1 Undertake assessment phase by assessing and evaluating potential impacts identified in the Scoping phase.
1.2 Review and manage specialist studies required.
1.3 Compile a draft Environmental Impact Report (EIR).
1.4 Compile a draft Environmental Management Plan for the Construction phase.
1.5 Compile an Information Sheet (summary of EIR) and distribute to identified I&APs
1.6 Distribute DEIR to I&APs
1.7 Allow the identified public to provide comment within a 30 day period on above report.
1.8 Address comments received and finalise EIR
1.9 Should the draft EIR require substantial changes, these changes will be incorporated into the final EIR and distributed.
1.10 Submit EIR to authorities for a final decision
1.11 Once the decision is issued, all I&Ps must be formally informed of the decision

12.9 Measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored

An EIA involves *prediction* and thus a certain degree of *uncertainty* is an integral part. There are two types of uncertainty associated with environmental impact assessments: those associated with the process and, those associated with predictions. With the former the uncertainty is whether the most important impacts have been identified and whether recommendations will be acted upon or ignored.

For the latter, the uncertainty is in the accuracy of the findings. The main types of uncertainty and the ways in which they can be minimized are summarized as follows:

- ❖ **Uncertainty of prediction:** this is important at the data collection stage and the final certainty will only be resolved once implementation commences. Research can reduce the uncertainty;
- ❖ **Uncertainty of values:** this reflects the approach taken in the EIA process. Final certainty will be determined at the time decisions are made. Improved communications and extensive negotiations should reduce this uncertainty;
- ❖ **Uncertainty of related decision:** this affects the decision making element of the EIA process and final certainty will be determined by post evaluation. Improved coordination will reduce uncertainty.

The importance of *wide consultation* cannot be overemphasized in minimizing the risk of missing important impacts. The significance of impacts is subjective, but the value judgments required are best arrived at by consensus: public participation and consultation with a wide sector of the community will reduce uncertainty.

The accuracy of predictions is dependent on a variety of factors such as lack of data or lack of knowledge. Prediction capabilities are generally good in the physical and chemical sciences, moderate in ecological sciences and poor in social sciences.

The results of the EIA should indicate the level of uncertainty with the use of confidence limits and probability analyses wherever possible. Sensitivity analysis similar to that used in economic evaluation, could be used if adequate quantifiable data are available. A range of outcomes can be found by repeating predictions and adjusting key variables.

An EIA cannot give a precise picture of the future. The EIA enables uncertainty to be managed and, as such, is an aid to better decision making. (*S. Cliff, 2015, P92.*)

13. AFFIRMATION BY EAP

- I, Mr JP de Villiers declare under oath that I:
- a. act as the independent environmental practitioner in this application ;
 - b. do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
 - c. do not have and will not have a vested interest in the proposed activity proceeding;
 - d. have no, and will not engage in, conflicting interests in the undertaking of the activity;
 - e. undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required;
 - f. will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
 - g. will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
 - h. will keep a register of all interested and affected parties that participated in a public participation process; and
 - i. will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Signature of the Environmental Assessment Practitioner:

Name of company:

Date:

Signature of the Commissioner of Oaths:

Date

Designation

Official stamp:

14. LIST OF REFERENCES

Department of Environmental Affairs and Tourism. 1992. Integrated Environmental Management. Pretoria, DEAT.

Department of Environmental Affairs and Tourism. 1998. *Guideline Document - EIA Regulations.* Pretoria, DEAT.

Department of Environmental Affairs. 1988. *Climate of South Africa, climate statistics up to 1984.* Weather Bureau (WB40). Pretoria, Government Printer.

Department of Transport, 19--. *Climate of South Africa Part 1 Climate statistics.* Weather Bureau (WB20). Pretoria Government Printer.

S. Cliff. 2015. Environmental Scoping report for the proposed high density residential township "Tanganani extension 7", to be located on a part of Portion 119 of the farm Diepsloot 388 JR, City of Johannesburg Municipality, Gauteng

DAFF (2018). *Economic Review of South African Agriculture 2017/18.* Pretoria: Department of Agriculture, Forestry and Fisheries, Directorate: Statistics and Economic Analysis, Republic of South Africa

