Draft Basic Assessment Report – Proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

DRAFT BASIC ASSESSMENT REPORT

April 2018

Prepared for: Ingwazi Trading (Pty) Ltd

CSIR

our future through science

BASIC ASSESSMENT PROCESS

DRAFT BASIC ASSESSMENT REPORT – PROPOSED INGWAZI TRADING (PTY) LTD CHICKEN BROILER FACILITY, 74 DAHLIA ROAD, WELGEDACHT A.H. SPRINGS, GAUTENG.

DRAFT BASIC ASSESSMENT REPORT

April 2018

Prepared for:
Ingwazi Trading (Pty) Ltd

Prepared by:
CSIR
P O Box 320, Stellenbosch, 7599
Tel: +27 21 888 2482
Fax: +27 21 888 2473
Email: kstroebel@csir.co.za

Lead Authors:
Kelly Stroebel
Minnelise Levendal

REPORT DETAILS

Title:	**Basic Assessment for the proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng.**
Purpose of this report:	The purpose of this BA Report is to: • Present the proposed project and the need for the project; • Describe the affected environment at a sufficient level of detail to facilitate informed decision-making; • Provide an overview of the BA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; • Provide an Environmental Management Programme (EMPr) for the proposed project. This BA Report is the Draft Version submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) for review.
Prepared for:	Ingwazi Trading (Pty) Ltd
Prepared by:	CSIR P O Box 320, Stellenbosch, 7599 Tel: +27 21 888 2408 Fax: +27 21 888 2493
Lead author:	Kelly Stroebel
Date:	April 2018
To be cited as:	CSIR, 2018. Draft Basic Assessment Report for the proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng.

ENVIRONMENTAL ASSESSMENT PRACTITIONER

Organisation	Council for Scientific and Industrial Research (CSIR)
Postal Address	PO Box 320, Stellenbosch, 7599
Email	kstroebel@csir.co.za
Telephone No.	021 888 2482
Fax	021 888 2693

Project Team:

NAME	**QUALIFICATION & EXPERTISE**
Kelly Stroebel **(Project Manager)**	• BSc (Honours) Environmental Science (Rhodes University). Cand.Sci.Nat. • 4+ years' experience in the environmental management field • Over 4 years' experience conducting Environmental Assessments
Minnelise Levendal **(Project Reviewer)**	• MSc Biological Science (Botany) (Stellenbosch University). Pr. Sci.Nat. • 17 years of experience in Environmental Management • Inclusive of 11 years' experience in conducting Environmental Assessments

The Council for Scientific and Industrial Research has been one of the leading organisations in South Africa contributing to the development and implementation of environmental assessment and management methodologies. The CSIR's Environmental Management Services (EMS) unit has over 20 years of experience in environmental management practices, involving conducting environmental assessment and management studies in over 15 countries in Africa. Key sectors of CSIR's work include renewable energy, infrastructure, natural resource management, mining, industrial development and oil and gas. CSIR's environmental assessments are conducted with national legal requirements as well as those of international agencies such as the World Bank, International Finance Corporation and World Health Organisation.

CONTENTS

APPENDIX A:	Site plan(s) – (must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)
APPENDIX B:	Photographs
APPENDIX C:	Facility illustration(s)
APPENDIX D:	Route position information – **NOT APPLICABLE**
APPENDIX E:	Public Participation information
APPENDIX F:	SAHRA information, service letters from municipalities, water supply information – **NOT APPLICABLE**
APPENDIX G:	Specialist report
APPENDIX H:	EMPr
APPENDIX I:	Other information • I-1: CV's of the project team (EAPs who prepared the report) • I-2: EAP declaration

TABLES

FIGURES

GLOSSARY

BA	Basic Assessment
BAR	Basic Assessment Report
CI	Conservation Important
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GDARD	Gauteng Department of Agriculture and Rural Development
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEM:WA	National Environmental Management: Waste Act, Act No. 59 of 2008
NHRA	National Heritage Resources Act, Act No. 25 of 1999
NSS	Natural Scientific Services
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAPPO	South African Pork Producers' Organisation
SDF	Spatial Development Framework
WUL	Water Use Licence
NWA	National Water Act, Act No. 36 of 1998
WULA	Water Use Licence Application

Requirements according to Appendix 1 of GNR 326 of 4 December 2014 (as amended April 2017) – Scope of Assessment and Content of BAR

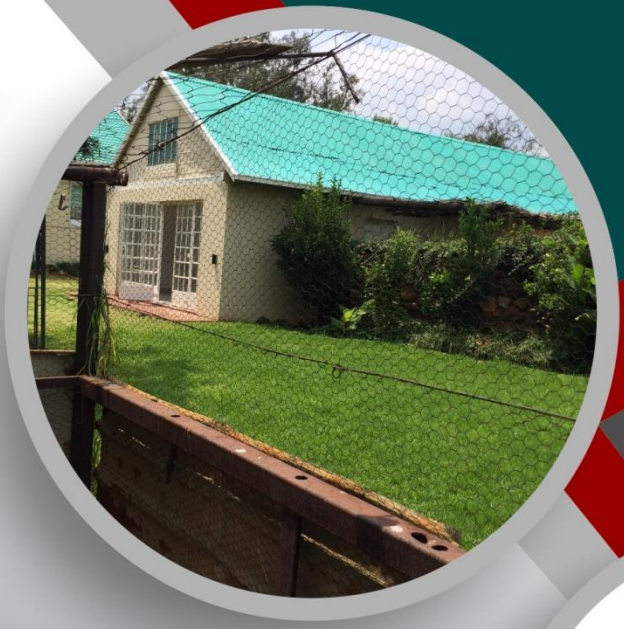
SCOPE OF ASSESSMENT AND CONTENT OF BAR	SECTION IN BAR
1) A basic assessment report must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must include - (a) details of – i. the EAP who prepared the report; and	Page 2
ii. the expertise of the EAP, including a curriculum vitae;	Page 2 Appendix I
(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, the coordinates of the boundary of the property or properties;	Section B Appendix A
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure 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;	Appendix A
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered and being applied for; and (ii)a description of the activities to be undertaken including associated structures and infrastructure ;	Section A
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section A2 Section E7
(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;	Section B9 Section E9
(g) a motivation for the preferred site, activity and technology alternative;	Section A3
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (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; (iv) the environmental attributes associated with the alternatives	Section A3 Appendix E

SCOPE OF ASSESSMENT AND CONTENT OF BAR	SECTION IN BAR
focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (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 these impacts- (aa) can be reversed (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (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 geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section B Appendix G Section E Appendix F
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section E, Appendix G Appendix H
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	Section E Appendix G
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Appendix H
(l) an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (i) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas	Section E Appendix A Appendix G

SCOPE OF ASSESSMENT AND CONTENT OF BAR	SECTION IN BAR
that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	Section E Appendix G Appendix H
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Appendix G
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Appendix G Section E
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Appendix G Section E8
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(r) an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) 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; and	Appendix I Section C Appendix E
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t) any specific information that may be required by the competent authority; and	N/A
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

Draft Basic Assessment Report – Proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

DRAFT BASIC ASSESSMENT REPORT



CONTENTS

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014 (Version 1)

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.
2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
3. **A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.**
4. **A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.**
5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.
6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
8. An incomplete report may lead to an application for environmental authorisation being refused.
9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**
10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.
11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.
12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.
13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

DEPARTMENTAL DETAILS

Gauteng Department of Agriculture and Rural Development
Attention: Administrative Unit of the of the Environmental Affairs Branch
P.O. Box 8769
Johannesburg
2000

Administrative Unit of the of the Environmental Affairs Branch
Ground floor Diamond Building
11 Diagonal Street, Johannesburg

Administrative Unit telephone number: (011) 240 3377
Department central telephone number: (011) 240 2500

(*For official use only*)

NEAS Reference Number:						
File Reference Number:						
Application Number:						
Date Received:						

If this BAR has not been submitted within 90 days of receipt of the application by the competent authority and permission was not requested to submit within 140 days, please indicate the reasons for not submitting within time frame.

N/A

Is a closure plan applicable for this application and has it been included in this report?

if not, state reasons for not including the closure plan.

This application is for the development of a chicken broiler facility which will exist for the foreseeable future, therefore a closure plan is not applicable in this case.

Has a draft report for this application been submitted to a competent authority and all State Departments administering a law relating to a matter likely to be affected as a result of this activity? Yes

Is a list of the State Departments referred to above attached to this report including their full contact details and contact person?

Yes

If no, state reasons for not attaching the list.

N/A

Have State Departments including the competent authority commented? No

If no, why?

This Draft BA Report is currently being released for a 30-day review period. Following the review period any comments received from State Departments (including the competent authority) will be incorporated into the Final BA Report which will be submitted to Gauteng Department of Agriculture and Rural Development for decision-making. An application for EA as well as the relevant public participation actions (i.e. newspaper advertisement) accompany the release of this Draft BA Report.

SECTION A: ACTIVITY INFORMATION

A.1 Proposal or Development Description

Project title (must be the same name as per application form):

Basic Assessment for the proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng.

Select the appropriate box

The application is for an expansion of an existing development	X	The application is for a new development		Other, specify	

Does the activity also require any authorisation other than NEMA EIA authorisation?

[redacted] NO

If yes, describe the legislation and the Competent Authority administering such legislation

N/A

If yes, have you applied for the authorisation(s)?
If yes, have you received approval(s)? (attach in appropriate appendix) [redacted]

A.2 Applicable legislation, policies and/or guidelines

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
National Water Act, 1998 (Act No. 36 of 1998) as amended	National	26 August 1998
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	National & Provincial	28 April 1999
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	National & Provincial	7 June 2004
National Environmental Management Waste Act, 2009 (Act No. 59 of 2008)	National & Provincial	10 March 2009
Environmental Impact Assessment Regulations, 2014	National & Provincial	4 December 2014
National Development Plan: A Vision for 2030	National	19 February 2013
Department of Environmental Affairs Guidelines on Public Participation	National & Provincial	10 October 2012

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
Spatial Planning Land Use Management Act, 2013 (Act No. 16 of 2013)	National	6 August 2013
Gauteng Provincial Environmental Framework, 2014	Provincial	November 2014
City of Ekurhuleni Integrated Development Plan 2017/18 - 2020/21	Provincial & Local	29 March 2017
Ekurhuleni Metropolitan Spatial Development Framework: 2015	Provincial	2015
Ekurhuleni Regional Spatial Development Framework: 2015	Regional/Local	2015

Description of compliance with the relevant legislation, policy or guideline:	
Legislation, policy of guideline	**Description of compliance**
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	The Environmental Authorisation for the proposed development is lawfully applied for in terms of the EIA Regulations, 2014, promulgated under NEMA. The conditions on the Environmental Authorisation, if approved, will be adhered to.
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	The proposed project has been submitted to the South African Heritage Resources Agency (SAHRA) online platform South African Heritage Resources Information System (SAHRIS)
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) as amended (NEMBA) including all the pertinent legislation published in terms of this act was considered in undertaking this Basic Assessment process. This included the determination and assessment of the fauna and flora prevailing in the proposed project and the handling thereof in terms of NEMBA.
National Environmental Management Waste Act, 2009 (Act No. 59 of 2008)	The Waste Management practices will be undertaken in respect of the National Environmental Management: Waste Act (Regulations published in GNR 921 on the 29 November 2013 Government Gazette No 37083) as amended NEM:WA. Pieces of legislation published under this act will be adhered to.
Environmental Impact Assessment Regulations, 2014	All the triggered activities as per National Environmental Management Act (Act No. 107 of 1998) have been listed below.
National Development Plan: A Vision for 2030	The South African Government through the Presidency has published a National Development Plan. The Plan aims to eliminate poverty and reduce inequality by 2030. The Plan has the target of developing people's capabilities to be to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety. It proposes the following strategies to address the above goals: 1. Creating jobs and improving livelihoods; 2. Expanding infrastructure; 3. Transition to a low-carbon economy; 4. Transforming urban and rural spaces; 5. Improving education and training; 6. Providing quality health care; 7. Fighting corruption and enhancing accountability; 8. Transforming society and uniting the nation.

Description of compliance with the relevant legislation, policy or guideline:	
Legislation, policy of guideline	**Description of compliance**
City of Ekurhuleni Integrated Development Plan 2017/18 - 2020/21	The City of Ekurhuleni's (CoE) IDP focuses on strategic goals and development strategies for 2017/18 to 2020/21. One of the key goals is food security on the region. The strategy is to strengthen food security and agriculture competitiveness, while lifting marginalized and rural households out of poverty by investing in required infrastructure, services, skills and productivity. Increase job creation in the rural areas (agriculture economy) and reduce the percentage of households who are vulnerable to hunger. This proposed project falls within the ambit of this goal and will aid in CoE reaching their intended food security objectives through agriculture. In terms of "Strategic Proposals and Catalytic Recommendations", the following strategic proposals are highlighted (pertinent to this project): • Agriculture should be developed (in conjunction with Lesedi) to become a meaningful contributor to the Ekurhuleni economy.
Ekurhuleni Metropolitan and Regional Spatial Development Frameworks: 2015	The Spatial Development Framework (SDF) is the legislated component of the municipality's IDP that prescribes development strategies and policy guidelines to restructure and reengineer the urban and rural form. The SDF is the municipality's long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The proposed project falls within Region D of the Spatial Development Framework. The area surrounding Springs within Region D has been identified in the SDF as "urban farms" and the focus is on the enhancement thereof. Proposed enterprises include: - Fruit and vegetables in the open and under hydroponics; - Fruit and nuts;

Description of compliance with the relevant legislation, policy or guideline:	
Legislation, policy of guideline	**Description of compliance**
	- Broiler and egg production; - Duck and geese production along the major streams and rivers. All these are in high demand locally and in international markets.

In terms of the National Environmental Management Act (NEMA) EIA Regulations published in GNR 327, 325 and 324 of December 2014 (as amended on 7 April 2017), Government Gazette Number 40772, a Basic Assessment (BA) process is required as the project applies to the following listed activities (detailed in Table 1 below).

Table 1: Listed Activities relating to the proposed project as per NEMA EIA Regulations (as amended 7 April 2017)

Relevant Notices:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per the Government Notice:	Description of each listed activity as per the project description
GN R327	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed project will include the clearance of approximately 1 ha of vegetation. On this 1 ha, Ingwazi proposes to construct the following additional facilities with a total footprint of 800 m²: - 6 x chicken houses (each with a footprint of 8.5 x 30 m); and - 1 x brooder house (with a footprint of 3.8m x 3m).
	40	The expansion and related operation of facilities for the concentration of poultry, excluding chicks younger than 20 days, where the capacity of the facility will be increased by: i. more than 1 000 poultry where the facility is situated within an urban area; or ii. more than 5 000 poultry per facility situated outside an urban area.	The proposed project will include the expansion of the facility from 3000 to 40 000 chickens (5 000 chickens per house x 8 houses).
GN. R 324	12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed site will include the clearance of 1 ha of vegetation. The site falls within the Blesbokspruit Highveld Grassland, a threatened ecosystem which is a Critically Endangered ecosystem as per the National Environmental

Relevant Notices:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per the Government Notice:	Description of each listed activity as per the project description
		c. Gauteng i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans; or iii. iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011).

A.3 Alternatives

Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. **Do not** include the no go option into the alternative table below.

Note: *After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.*

Please describe the process followed to reach (decide on) the list of alternatives below

The proposed alternative was drawn up based on the site sensitivities as determined by the ecological (fauna and flora) specialist study undertaken as part of this process. There are no additional locational alternatives for this proposed project.

Provide a description of the alternatives considered:

No.	**Alternative type,** either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	**Description**
1	Proposal (preferred alternative)	**Site location & layout:** Ingwazi Trading (Pty) Ltd (hereafter, Ingwazi Trading), is a small scale commercial farming enterprise (small-holding) registered at 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng (Figure 1). The property falls within Region D of the Ekurhuleni Metropolitan Municipality and falls on an urban edge. The site is currently zoned for agricultural use (Ekurhuleni MSDF, 2015) and is 1.7 ha in extent, of which 1 ha will be used for the development. The proposed project is aimed at providing "sustainable" products (i.e. broiler chickens) and ecologically responsible practices will be incorporated into the life cycle of the development. The layout plan of the preferred alternative has been developed based on the outcome of the specialist study and sensitivity mapping. The total development footprint would thus be 1 ha. This will be broken down into the following: **Current infrastructure on site** Currently, the existing chicken facility has a footprint of 0.25 ha and consists of the following infrastructure: - Farm house; - 3 x chicken houses (2 are empty); - Warehouse; - 2 x boreholes; - Storeroom; - Vegetable garden; - Small numbers of livestock; and - Water tower and tank. **Proposed expansion (pertinent to this application)** Ingwazi proposes to construct the following additional facilities with a total footprint of 800 m² (Figure 2 below): 6 x chicken houses (each with a footprint of 8.5 x 30 m); and 1 x brooder house (with a footprint of 3.8m x 3m). Bulk Services that may be required, i.e. sewerage, have already been installed privately to the satisfaction of the Municipality. A borehole exists on site for water provision for the proposed project. Power has been sourced from Eskom for the existing facility. Access roads to and on the site are already in existence.
2	Property Alternative	Due to the fact that there is an existing enterprise on the site, there have been no alternative properties or locations identified for the proposed project. Therefore this is the only small-holding the applicant can perform the proposed activities and it would not be economically feasible for the business to find and or purchase new property. Therefore, no alternate properties have been investigated

No.	**Alternative type,** either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	**Description**
		in the Basic Assessment.
3	Activity Alternative	Due to the fact that this site is already housing a chicken broiler facility of approximately 3000 chickens, this has become an industry in which the applicant regards as their key skill which is leading to their current and future employment. The expansion will further enhance the sustainability of the business.
4	Design or Layout Alternative	The proposed design and layout will be placed on the property in a means which minimise the impact it can have on the environment. The layout of the chicken broiler houses is focused on the biosecurity measure, which allows for more effective management of chicken broiler production as it lessens the risk of the broiler chickens catching diseases if the activity were to be an open environment or being stolen. These also allow for the most efficient compliance to chicken welfare legislation, maximising chicken production outputs.
5	Technology to be used	The technology to be used is in line with chicken broiler standards, it further leads to chicken welfare as well as complying with best practices in broiler chicken production. No other technologies have been investigated due to the current technologies that are used in the existing Ingwazi enterprise and the expansion will be in line with best practices associated with broiler chicken production.

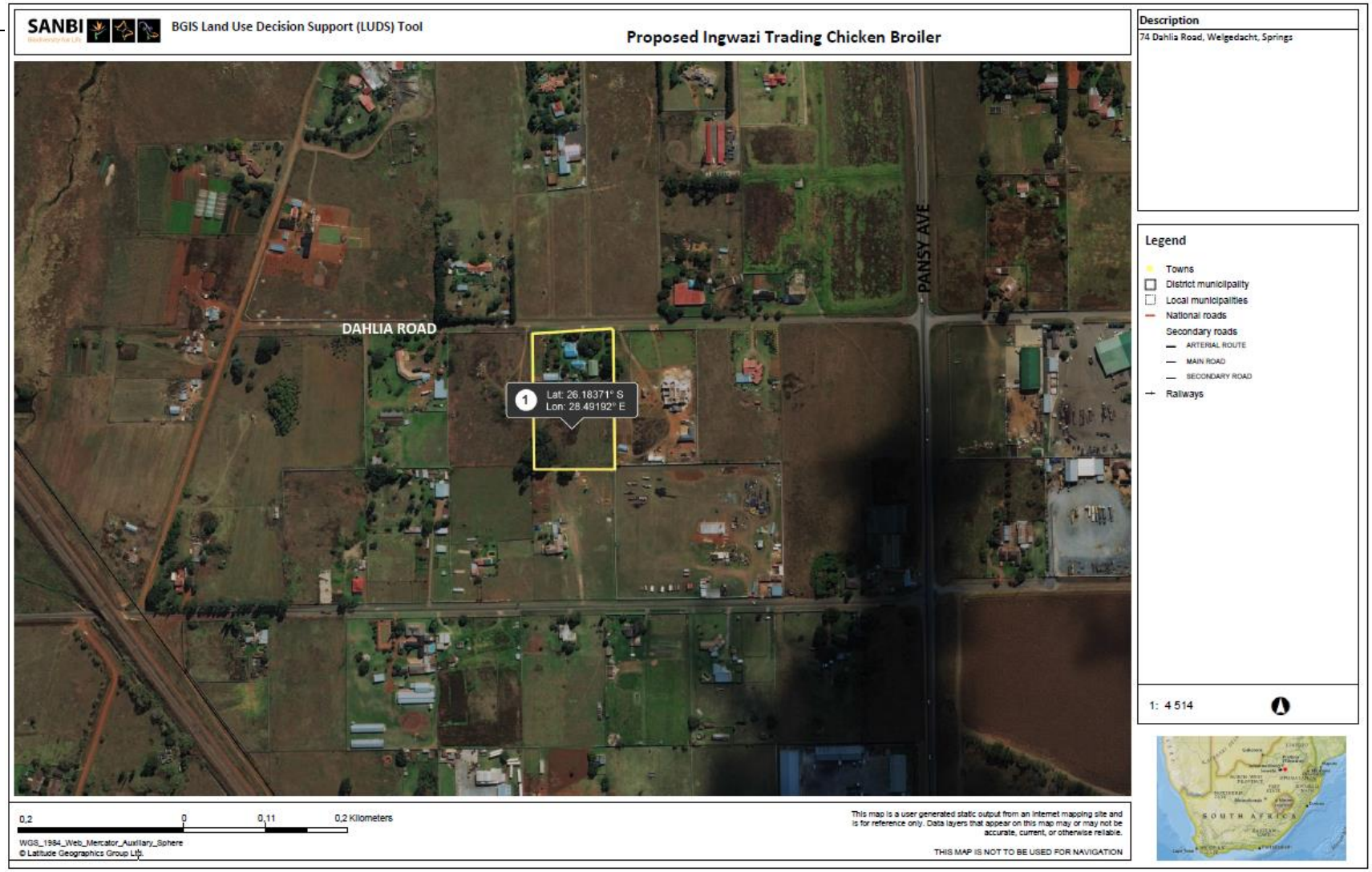


Figure 1: Site location of the preferred alternative (proposal)

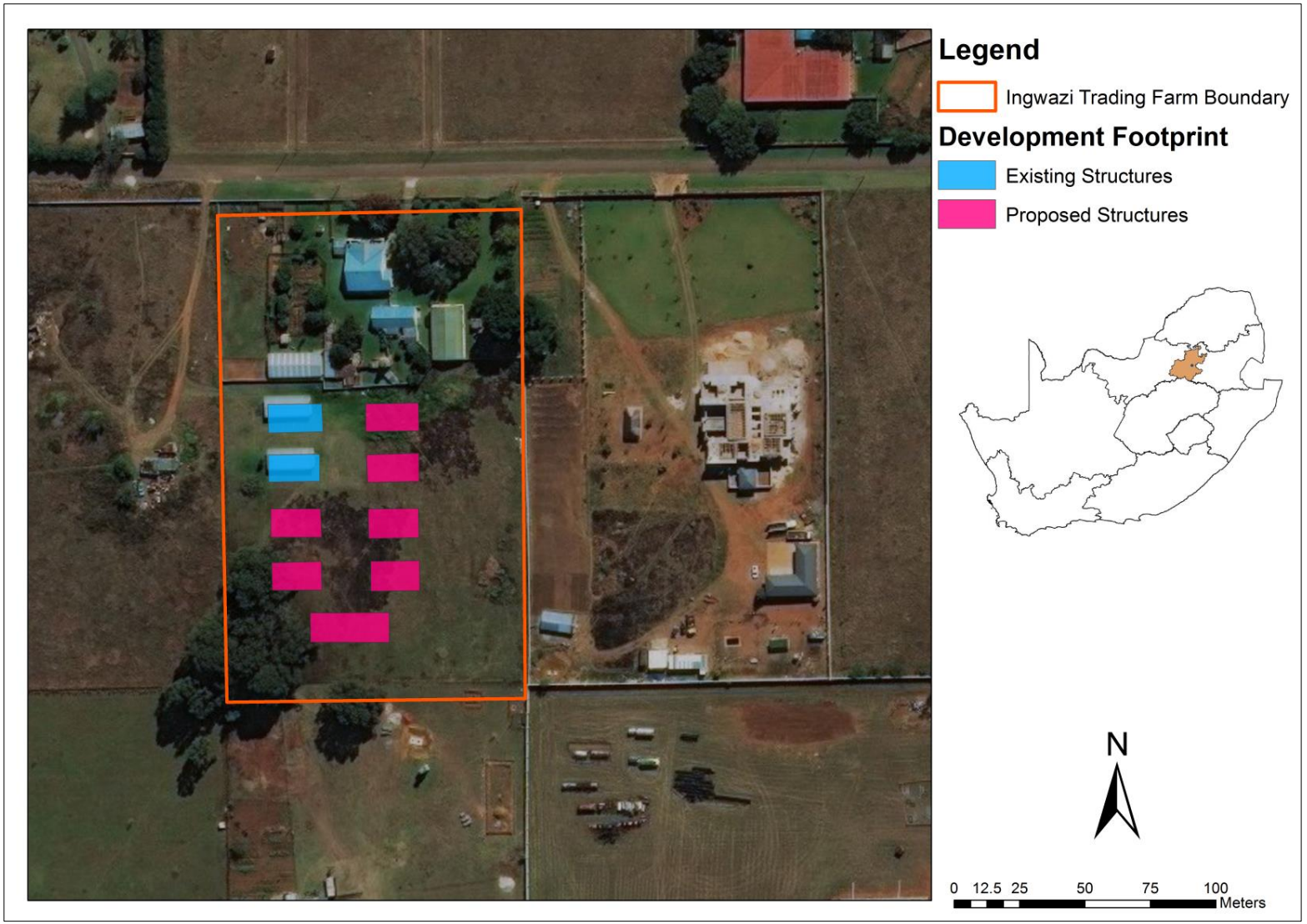


Figure 2: Site layout of the preferred alternative (proposal)

In the event that no alternative(s) has/have been provided, a motivation must be included in the table below.

Motivation for the exclusion of alternatives:

1. **Site location and layout alternatives**

The Department of Environmental Affairs (DEA) commissioned the Council for Scientific and Industrial Research (CSIR) to run the "Special Needs and Skills Development (SNSD) Programme" which is aimed at providing pro bono Environmental Impact Assessments (EIAs) for people who are classified as special needs clients/applicants, specifically Small, Medium and Micro Enterprises (SMMEs), Community Trusts, Individuals or Government Programmes. The CSIR received an application from Ingwazi Trading (Pty) Ltd under the SNSD Programme. The CSIR identified the Ingwazi Trading (Pty) Ltd as a client or a special needs applicant and has agreed to assist them with acquiring Environmental Authorization for the project on a pro bono basis, including the cost of the basic assessment, specialist studies, site visits and human resources.

Ingwazi Trading is a small enterprise which is aiming to expand to further its economic viability in the future. Currently, Ingwazi Trading is operating at a very small and local scale, and the business is positioned on a small-holding owned by the applicant. Thus, the site which is being investigated in this report is the only site available to this entity and there are no available alternative sites to be considered.

The layout of the proposed project has been carefully informed by the findings of the Ecological Impact Assessment (Appendix G).

2. **Design, technology & operational alternatives**

The operating plan for the proposed project has been informed by extensive market research and an assessment of the need of the products that will be produced. A robust economic assessment has been submitted to the SNSDP for the approval of this project. In addition to the economic viability, the project does not make use of major technologies, which in turn results in the proposed development requiring very little energy. All waste from the broiler facility is being re-cycled into fertilizer for small vegetable production. The broilers are being sold 100% locally and the jobs being created by the proposed development will be sourced to local communities.The pre-development research which has been conducted on this project has been extensive, including feasibility studies and market research as well as production research. Applying the top principles in growing chickens will be adopted by Ingwazi Trading. The proposed design and technology include the structure of the chicken houses will be made of slates and concrete floors, it will be cleaned out only at the end of every six week cycle where they combination of saw dust, used as bedding, and manure will be used by local farmers as fertilizer. The environment within the chicken house will be completely controlled powered by a generator or boilers, the ventilation will be natural with the drawing or closing of side curtain of the chicken houses to control airflow. In terms of the positives which have given rise to this development option being pursued, some of the major factors are:

- There is currently a small broiler facility n site and the applicant has the knowledge and expertise in this area.
- The turnaround production time is quicker for chickens than red meat production.
- Broiler facilities can be established in relatively small areas.
- Feed costs are much lower than alternative meat production costs.
- The demand for poultry products has increased significantly over recent years due to the high price and unavailability of red meat substitutes.

Thus, due to the nature of the industry, the support structures and the knowledge and experience of Ingwazi Trading, the proposed project alternatives are the only viable alternatives to take forward to the Impact Assessment phase.

A.4 Physical size of the activity

Indicate the total physical size (footprint) of the proposal as well as alternatives. Footprints are to include all new infrastructure (roads, services etc), impermeable surfaces and landscaped areas:

	Size of the activity:
Proposed activity ***(Total environmental (landscaping, parking, etc.) and the building footprint)***	1 ha
Alternatives:	
Alternative 1 (if any)	[redacted]
Alternative 2 (if any)	
	Ha/ m^2

or, for linear activities:

	Length of the activity:
Proposed activity	[redacted]
Alternatives:	
Alternative 1 (if any)	[redacted]
Alternative 2 (if any)	
	m/km

Indicate the size of the site(s) or servitudes (within which the above footprints will occur):

	Size of the site/servitude:
Proposed activity	1.7 ha
Alternatives:	
Alternative 1 (if any)	[redacted]
Alternative 2 (if any)	
	Ha/m^2

A.5 Site Access

Proposal

Does ready access to the site exist, or is access directly from an existing road? YES [redacted]
If NO, what is the distance over which a new access road will be built
Describe the type of access road planned:

N/A

Include the position of the access road on the site plan (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

Alternative 1

Does ready access to the site exist, or is access directly from an existing road? [redacted]
If NO, what is the distance over which a new access road will be built
Describe the type of access road planned:

N/A

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

Alternative 2

Does ready access to the site exist, or is access directly from an existing road? [redacted]
If NO, what is the distance over which a new access road will be built
Describe the type of access road planned:

N/A

Include the position of the access road on the site plan. (if the access road is to traverse a sensitive feature the impact thereof must be included in the assessment).

PLEASE NOTE: Points 6 to 8 of Section A must be duplicated where relevant for alternatives

Section A 6-8 has been duplicated | **0** | Number of times

(only complete when applicable)

Note from CSIR: Please see Section 3 above which provides a motivation for the exclusion of alternatives and the assessment thereof. Thus, this section will not be duplicated as only 1 alternative (preferred alternative) applies.

A.6 Layout or Route Plan

A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached to this document. The site or route plans must indicate the following:

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
  - A4 size for activities with development footprint of 10sqm to 5 hectares;
  - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
  - A2 size for activities with development footprint of >20 hectares to 50 hectares);
  - A1 size for activities with development footprint of >50 hectares);
-
- The following should serve as a guide for scale issues on the layout plan:
  - A0 = 1: 500
  - A1 = 1: 1000
  - A2 = 1: 2000
  - A3 = 1: 4000
  - A4 = 1: 8000 (±10 000)
- shapefiles of the activity must be included in the electronic submission on the CD's;
- the property boundaries and Surveyor General numbers of all the properties within 50m of the site;
- the exact position of each element of the activity as well as any other structures on the site;
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure;
- servitudes indicating the purpose of the servitude;
- sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):
  - Rivers and wetlands;
  - the 1:100 and 1:50 year flood line;
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation (even if it is degraded or infested with alien species);
- Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the position of the relevant buffer from the bank to be clearly indicated)

FOR LOCALITY MAP (NOTE THIS IS ALSO INCLUDED IN THE APPLICATION FORM REQUIREMENTS)

- the scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map;
- the locality map and all other maps must be in colour;
- locality map must show property boundaries and numbers within 100m of the site, and for poultry and/or piggery, locality map must show properties within 500m and prevailing or predominant wind direction;
- for gentle slopes the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);
- locality map must show exact position of development site or sites;
- locality map showing and identifying (if possible) public and access roads; and
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites.

Note from CSIR: A Locality map depicting the current and proposed chicken facility on the property has been included as Appendix A. Photographs can also be found in Appendix B and in the Ecological Specialist Report (CSIR, April 2018) attached as Appendix G.

A.7 Site photographs

Colour photographs from the center of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under the appropriate Appendix. It should be supplemented with additional photographs of relevant features on the site, where applicable.

Note from CSIR: Site photographs in the eight major compass directions have been included as Appendix B. Photographs indicating sensitive features on site can also be found in the Ecological Specialist Report (CSIR, 2018) attached as Appendix G.

A.8 Facility illustration

A detailed illustration of the activity must be provided at a scale of 1:200 for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity to be attached in the appropriate Appendix.

Note from CSIR: An illustration of the structures for the proposed activities on site can be found in the "Project Site Sensitivity Map" in Appendix A.

SECTION B: SITE / AREA / PROPERTY DESCRIPTION

Note: Complete Section B for the proposal and alternative(s) (if necessary)

Note from CSIR: Please see Section 3 above which provides a motivation for the exclusion of alternatives and the assessment thereof. Thus, this section will not be duplicated as only 1 alternative (preferred alternative) applies.

Instructions for completion of Section B for linear activities

1) For linear activities (pipelines etc) it may be necessary to complete Section B for each section of the site that has a significantly different environment.
2) Indicate on a plan(s) the different environments identified
3) Complete Section B for each of the above areas identified
4) Attach to this form in a chronological order
5) Each copy of Section B must clearly indicate the corresponding sections of the route at the top of the next page.

Section B has been duplicated for sections of the route	**0**	times

Instructions for completion of Section B for location/route alternatives

1) For each location/route alternative identified the entire Section B needs to be completed
2) Each alterative location/route needs to be clearly indicated at the top of the next page
3) Attach the above documents in a chronological order

Section B has been duplicated for location/route alternatives	**0**	times	(complete only when appropriate)

Instructions for completion of Section B when both location/route alternatives and linear activities are applicable for the application

Section B is to be completed and attachments order in the following way

- All significantly different environments identified for Alternative 1 is to be completed and attached in a chronological order; then
- All significantly different environments identified for Alternative 2 is to be completed and attached chronological order, etc.

Section B - Section of Route	**N/A**	(complete only when appropriate for above)
Section B – Location/route Alternative No.	**N/A**	(complete only when appropriate for above)

B.1 Property Description

Property description: (Including Physical Address and Farm name, portion etc.)	74 Dahlia Road, Welgedacht A.H., Springs, Gauteng.

B.2 Activity Position

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:	**Latitude (S):**	**Longitude (E):**
	26°10'59.06"S	28°29'30.78"E

In the case of linear activities:

Alternative:	**Latitude (S):**	**Longitude (E):**
▪ Starting point of the activity		
▪ Middle point of the activity		
▪ End point of the activity		

For route alternatives that are longer than 500m, please provide co-ordinates taken every 250 meters along the route and attached in the appropriate Appendix

The 21 digit Surveyor General code of each cadastral land parcel

PROPOSAL	See note below
Alt. 1	
Alt. 2	
etc.	

Note from CSIR: There is no SG code associated with this property. It is identifiable using the ERF number:

ERF X16 000 00000074 , 74 Dahlia Road, Welgedacht A.H., Springs.

B.3 Gradient of the site

Indicate the general gradient of the site.

	1:50 – 1:20

B.4 Location in landscape

Indicate the landform(s) that best describes the site.

	Plain

B.5 Groundwater, Soil and Geological stability of the site

a) Is the site located on any of the following?

Shallow water table (less than 1.5m deep)	NO
Dolomite, sinkhole or doline areas	NO
Seasonally wet soils (often close to water bodies)	NO
Unstable rocky slopes or steep slopes with loose soil	NO
Dispersive soils (soils that dissolve in water)	NO
Soils with high clay content (clay fraction more than 40%)	NO
Any other unstable soil or geological feature	NO
An area sensitive to erosion	NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s) NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**

c) are any caves located within a 300m radius of the site(s) NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**

d) are any sinkholes located within a 300m radius of the site(s) NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)

Latitude (S): **Longitude (E):**

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department

B.6 Agriculture

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 4)? NO

Please note: The Department may request specialist input/studies in respect of the above.

B.7 Groundcover

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Note from CSIR: All Conservation Important species on Site have been included in the Ecological Specialist Report attached as Appendix G.

Indicate the types of groundcover present on the site and include the estimated percentage found on site

	Natural veld with heavy alien infestation % = 30		
		Building or other structure % =30	Bare soil/transformed vegetation % =40

Please note: The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there any rare or endangered flora or fauna species (including red list species) present on the site	YES	

If YES, specify and explain:

Please refer to **Appendix G** for a full list of findings of the Ecological Specialist Study. A summary of these findings is described below:

Species richness: The small size of the study site and its disturbed nature, mean that species have been displaced, resulting in low species richness.

Endangered species: No Red Data flora or fauna are expected be found on this site.

Sensitive species and/areas: The project site falls in Soweto Highveld Grassland vegetation unit, which is considered to be Endangered; and more importantly the Blesbokspruit Highvelf Grassland, which is Critically Endangered (Mucina & Rutherford, 2006) (see figures 3 and 4 below).

Habitat quality and extent: The site has been transformed by fences, invasive plants, grazing of livestock, indiscriminant dumping or organic waste, diggings.

Impact on species richness and conservation: The expansion of the chicken broiler facility will have a small, permanent footprint, but will not significantly impact on the species diversity or associated ecosystems, given the current transformed nature that has altered the ecological state.

Connectivity: The proposed development will have limited fragmentation on surrounding ecosystems or habitats.

Management Recommendation: If any native fauna species are encountered or exposed during construction, depending on the species, should be removed and relocated to natural areas in the vicinity, or appoint a specialist**.** Alien and invasive plants must be removed. Re-establish indigenous vegetation in disturbed areas when the development is operational.

General opinion: From an ecological perspective, there is no objection against the proposed development, provided the mitigation measure are implemented.

The proposed project will be developed on previously transformed grassland, but it must be noted that a chicken broiler facility is a form of farming that entails habitat change and may potentially result in secondary ecological impacts from aspects such as habitat loss from construction of facilities, chicken waste and potential diseases. The conservation status of the site is ranked as **Low**, meaning that the land has little conservation value and that could be considered for development with little to no impact on the floral and faunal communities. There were no sensitive ecological systems or components recognised.

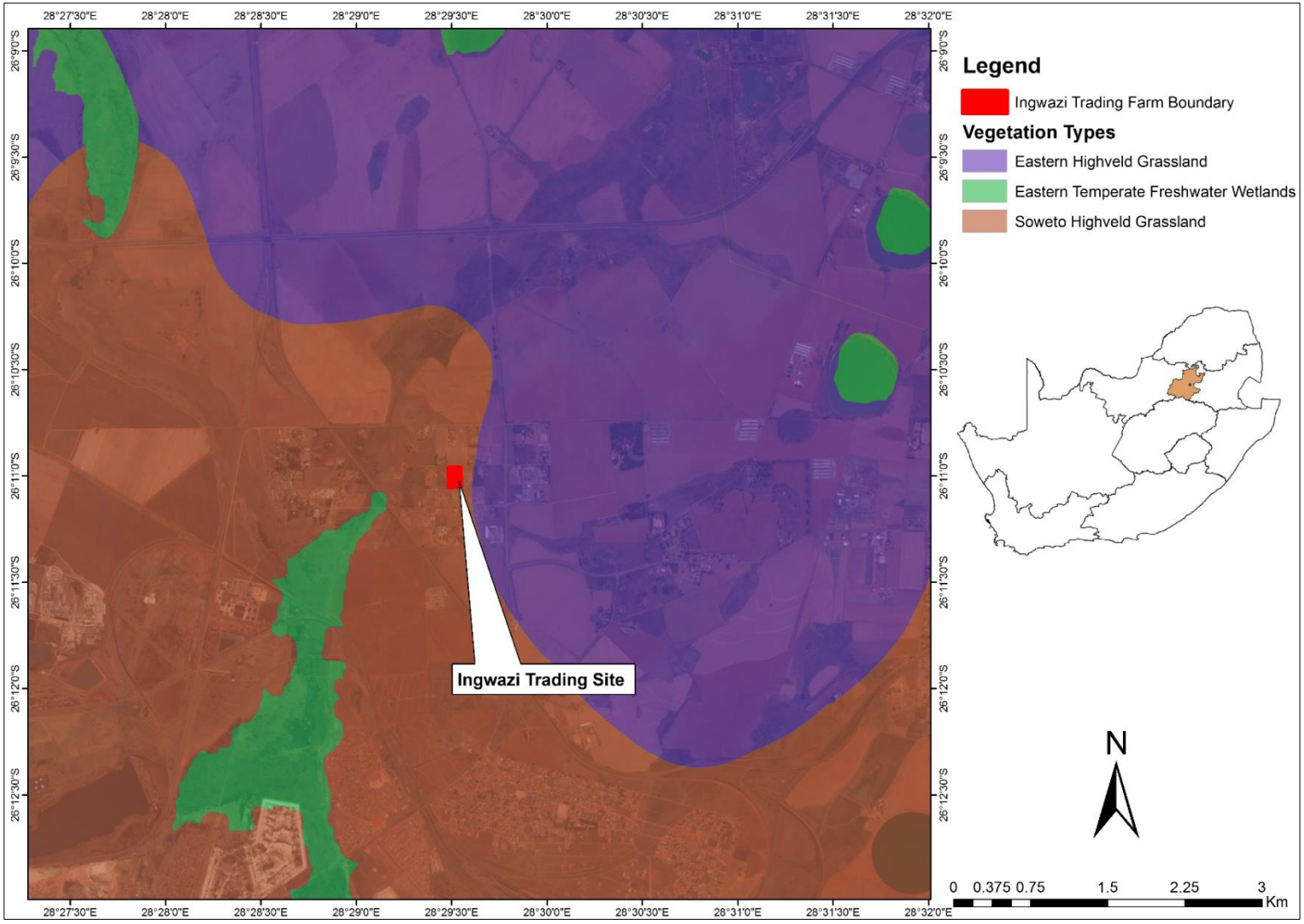


Figure 3: Regional vegetation type wherein the development site is situated (Ecological Specialist Study, Appendix G)

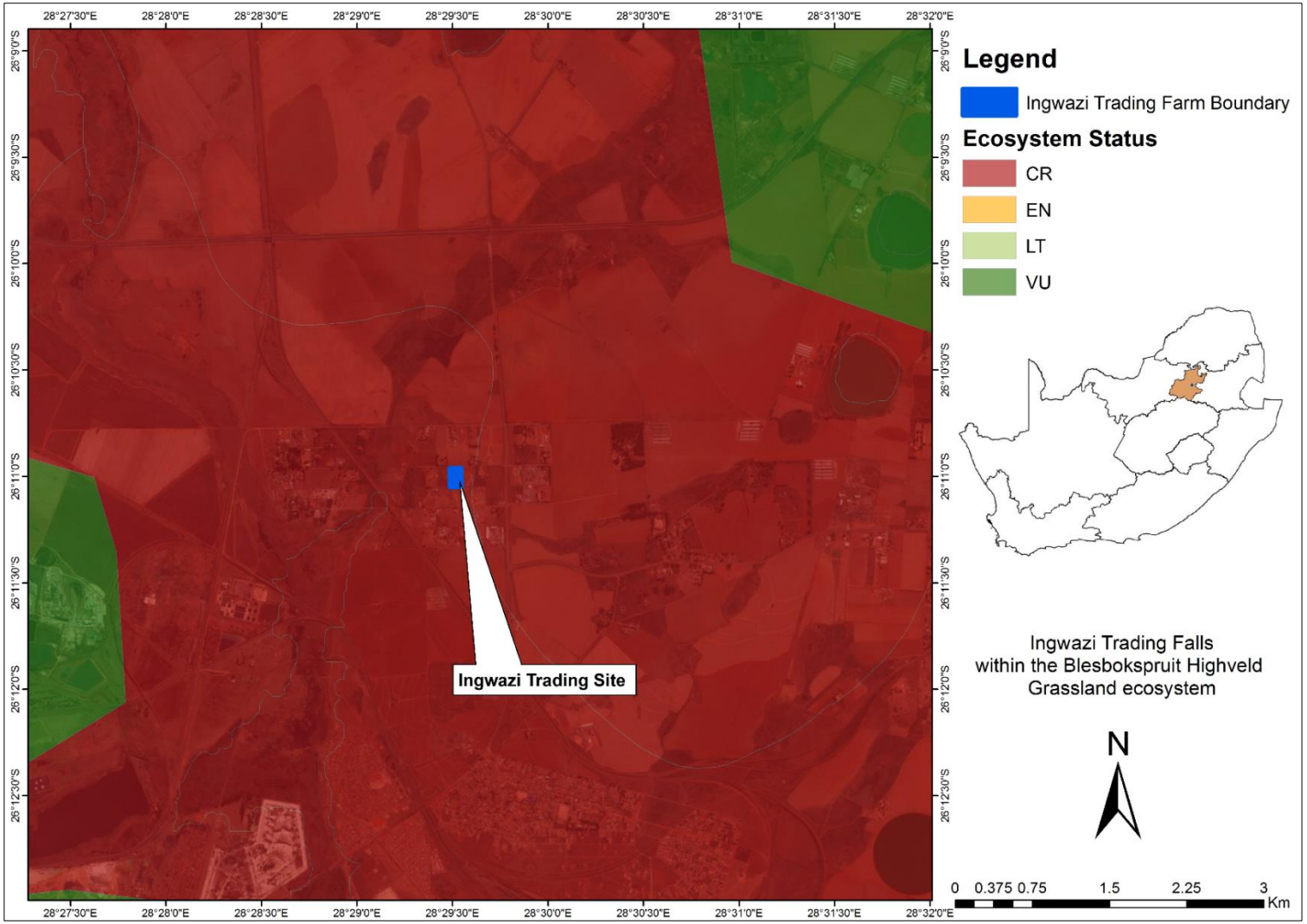


Figure 4: Regional location of the 1.7ha site within the original extent of the Blesbokspruit Highveld Grassland, a threatened ecosystem (Ecological Specialist Report, Appendix G)

Are there any rare or endangered flora or fauna species (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) radius of the site.	NO

If YES, specify and explain:

Are there any special or sensitive habitats or other natural features present on the site?	YES

If YES, specify and explain:

Please see explanation above (as well as Figures 3 and 4), and Appendix G for a full description of the sensitive habitats present on site. In summary:

The project site falls in Soweto Highveld Grassland vegetation unit, which is considered to be Endangered; and more importantly the Blesbokspruit Highveld Grassland, which is Critically Endangered (Mucina & Rutherford, 2006). However, the site has been transformed by existing infrastructure, alien invasive vegetation, livestock grazing, indiscriminate dumping of organic waste and diggings and the the conservation status of the site is deemed to be low.

Was a specialist consulted to assist with completing this section: YES

If yes complete specialist details

Name of the specialist:	Rirhandzu Marivate		
Qualification(s) of the specialist:	BSc Honours in Ecology, Environment and Conservation from the University of the Witwatersrand; Cand. Sci. Nat. Environmental Sciences – Reg Number: 100147/14		
Postal address:	PO Box 320, Stellenbosch		
Postal code:	7599		
Telephone:	021 888 2432	Cell:	
E-mail:	rmarivate@csir.co.za	Fax:	021 888 2472

Are any further specialist studies recommended by the specialist? NO

If YES, specify:

If YES, is such a report(s) attached?

If YES list the specialist reports attached below

Signature of specialist: *See note below* Date:

Notes from CSIR:

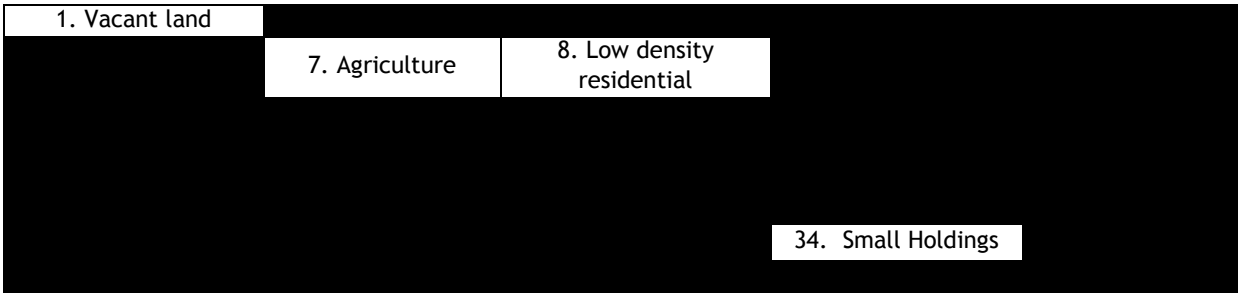
The Ecological Specialist Study was prepared in-house and thus a qualified external specialist reviewed the report. This review and the details of the reviewer can be found in **Appendix G, Page 94.**

Please see the full CV of the specialist and the specialist declaration as per Appendix 6 of the NEMA EIA Regulations (as amended on 7 April 2017) in the Ecological Specialist Report, attached as **Appendix G.**

Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

B.8 Land use character of surrounding area

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site



NOTE: Each block represents an area of 250m X 250m, if your proposed development is larger than this please use the appropriate number and orientation of hashed blocks

NORTH

1	**1**	**1**	**34**	**34**
1	**34**	**1**	**34**	**34**
34	**34**	**SITE**	**34**	**34**
34	**34**	**34**	**34**	**34**
34	**34**	**34**	**34**	**34**

WEST EAST

SOUTH

Note from CSIR: The proposed development is surrounded by small holdings with some vacant land. Please see locality and aerial maps for an indication of the density of the small holdings **(Appendix A and Ecological Report, Appendix G).**

Note: More than one (1) Land-use may be indicated in a block

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies. Specialist reports that look at health & air quality and noise impacts may be required for any feature above and in particular those features marked with an "A" and with an "N" respectively.

Have specialist reports been attached YES

If yes indicate the type of reports below

ECOLOGICAL SPECIALIST STUDY

Basic Assessment of the Proposed Expansion of a Chicken Broiler Facility on Smallholding 74 Dahlia Road, Welgedacht A.H.,Springs, Gauteng

March 2018

Prepared for:
Ingwazi Trading (Pty) Ltd.

Prepared by:
CSIR
P O Box 320, Stellenbosch, 7599
Tel: +27 21 888 2482
Fax: +27 21 888 2473
Email: RMarivate@csir.co.za

This report is attached as **Appendix G.**

B.9 Socio-economic context

Describe the existing social and economic characteristics of the area and the community condition as baseline information to assess the potential social, economic and community impacts.

When conceptualising a proposed project, the anticipated social and environmental impacts are generally broad and not limited to the exact site or location. However, compared to the direct, environmental impacts which are usually limited to the site, socio-economic impacts (i.e. additional labour requirements) may impact a wider area, and it is, therefore, important to consider the particular Municipality as well as the nearby towns or Wards in the most holistic way possible.

The proposed project falls within Region D of the Ekurhuleni Metropolitan Municipality (EMM) (Ekurhuleni MSDF, 2015). Region D is one of the six regions in EMM's area of jurisdiction. It comprises the central eastern areas within the EMM and includes three of the nine CBDs within the EMM: Benoni, Brakpan and Springs. Region D is situated to the south of Region C, with Lesedi Local Municipality to the east, Region E to the south and Region A to the west (see Figure 5 below). Region D is predominantly bound by the N12 to the north and the N17 to the south. Both these national.

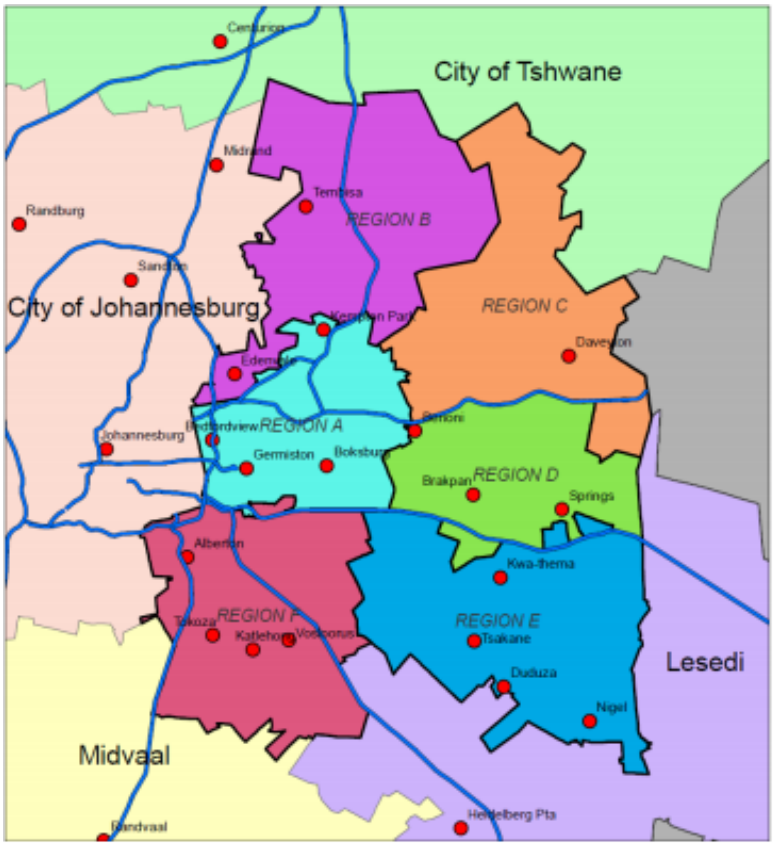


Figure 5: Region D of EMM in which this proposed project falls (Springs) (EMM MSDF, 2015)

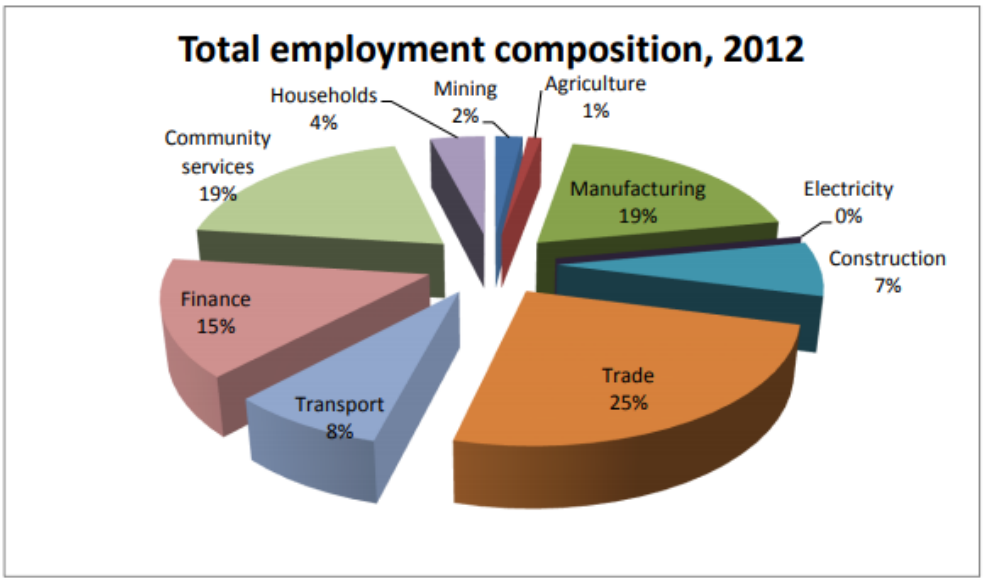
Region D is characterised by three well-established urban nodes: Benoni, Brakpan and Springs. These areas are in a state of decay and are in dire need of maintenance and upgrade. Low-density residential housing components go hand in hand with each of these urban nodes. Table 2 below summarizes the population figures for Region D.

Table 2: Key indicators of the population in Region D of EMM (MSDF, 2015)

Region D population indicators	Number/ percentage
Total population (2012)	233 000, people
Number of households (2012) (Average 3 people/household)	71 700 households
Avg. annual population growth rate (2002-2012)	2.43%
Projected population growth rate (2012-2017)	2.0%
Population forecast (2017)	257 000
Population density (2012)	1 090 people/ km²
Male : female split (2012)	1.1 males per female
Predominant age category (2012)	30 - 34 age category

Source: IHS Global Insight Regional eXplorer version 699

In Region D, the economic sector that recorded the largest number of employment in 2012 was the trade sector, with a total of 31 600 or 24.6% of the total employment. The manufacturing sector, with a total of 25 100 (19.5%) employed the second highest relative to the rest of the sectors. The electricity sector with 511 (0.4%) employed the least number of people in Region D, just less than the agricultural sector with 981 (0.8%) people employed. It is necessary to recognize that even though the agriculture sector currently contributes least to the region's economic growth, it is a sector that **offers significant opportunities for future growth** and development. Figure 6 below highlights the total employment in Region D per broad economic sector.



Source: IHS Global Insight Regional eXplorer version 699

Figure 6: Total employment in Region D per broad economic sector (MSDF, 2015)

Region D is located favourably in terms of the Economic Activity and Employment Area of Gauteng Province. This has the potential to impact negatively on the region should a desirable growth and development strategy not be in place. Benoni, Brakpan and Springs CBDs all fall within the growth path of Gauteng and should therefore be considered as important growth nodes. Region D can be described as a multi-centred region as it has multiple locations of economic activity (business and industrial) and human settlements. Urban development in Region D is predominantly concentrated around Benoni, Brakpan and Springs CBDs. However the eastern, western, southern and central areas within Region D are more developed than the northern areas. The existing residential

component in Region D predominantly accommodates the middle income group. Higher income groups reside in areas such as Presidentsdam (Springs), Petersfield Extension (Springs) and Sonneveld (Brakpan). The lower income or more affordable residential areas include Geduld (Springs), Welgedacht (Springs) and Wright Park (Springs). Most applications submitted between 2005 and 2012 were for residential developments predominantly in the Springs and Brakpan area. Informal settlements, backyards and hostels are located mostly in Payneville, Lindelani and Emandeni area. In the EMM there are approximately 165 000 informal structures in 199 informal settlements. 9% (15 200 units) of these informal structures are located in Region D.

Based on the natural resources such as water availability, geology, soil potential, climate and proximity to towns, five development zones were identified in the EMM MSDF (2015). The zones also take into consideration the demand for land by the previously disadvantaged and the benefit gained. The different agricultural zones are indicated in Figure 5. Welgedacht A.H., Springs (area of this proposed project) falls within **"urban farms"** as mentioned previously in this report.

The attributes of the zone are:

- High population density;
- Large portions of high and medium potential land that can be developed
- Potential for use of sewage effluent for irrigation. This is likely the area that has the biggest potential for small scale vegetable production and for stone fruit like peaches, plums and apricots;
- Theft and vandalism are problematic and have left many farms vacant;
- High land-reform potential for cooperative farmers that share marketing, have access to processing facilities within share equity schemes with existing farmers
- Housing development in much of this zone is inevitable over the longer term;

Proposed enterprises for this zone as per the MSDF (2015) include:

- fruit and vegetables in the open and under hydroponics;
- fruit and nuts; o broiler and egg production;
- duck and geese production along the major streams and rivers. This is a much neglected enterprise in South Africa, but is practised very successfully in in the Far-East. Duck and geese feed on grass and other plant material that grows along rivers. It therefore takes very little cost to produce meat, feathers and skins.

All these are in high demand locally and in international markets. The proposed project aligns with the guidelines on "urban farms" contained within the MSDF (2015).

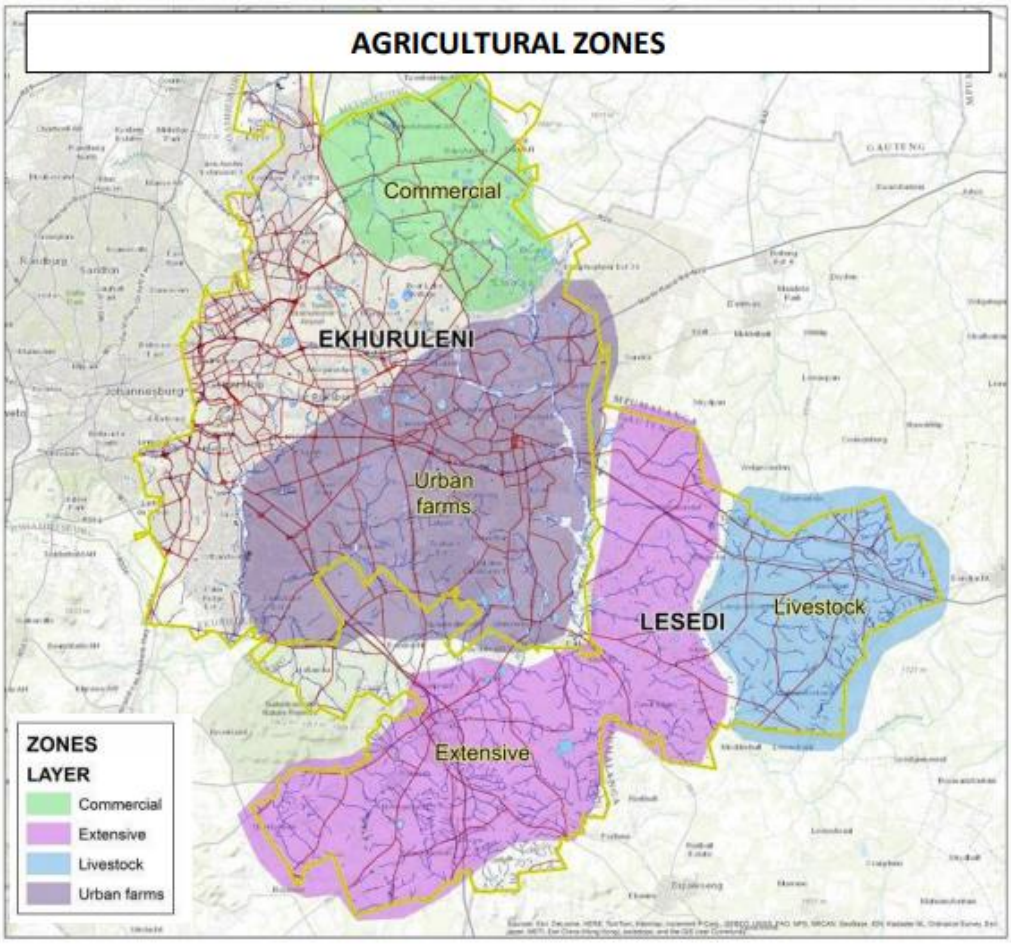


Figure 7: Agricultural zones identified for Region D of EMM (MSDF, 2015)

B.10 Cultural/Historical Features

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposal or alternatives, then you are requested to furnish this Department with written comment from the South African Heritage Resource Agency (SAHRA) – Attach comment in appropriate annexure

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-
(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50m in length;
(c) any development or other activity which will change the character of a site-
(i) exceeding 5 000 m2 in extent; or
(ii) involving three or more existing erven or subdivisions thereof; or
(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources
authority;
(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site? If YES, explain:	NO

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist if one was already appointed:

Will any building or structure older than 60 years be affected in any way?	NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)? If yes, please attached the comments from SAHRA in the appropriate Appendix	NO

Note from CSIR: This Draft Basic Assessment Report was uploaded to SAHRIS and any comments received will be included and incorporated into the Final Basic Assessment Report. Due to the fact that this chicken broiler expansion is going to take place on an existing small-holding that is only 1.7 ha in extent and has been somewhat transformed, it is not anticipated that any heritage resources will be present on site.

SECTION C: IMPACT ASSESSMENT

C.1 The Environmental Assessment Practitioner must conduct Public Participation Process in accordance with the requirement of the EIA Regulations, 2014.

C.2 Local authority participation

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority.

Was the draft report submitted to the local authority for comment?	YES
If yes, has any comments been received from the local authority?	NO

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):

This Draft BA Report is currently out for a 30-day review period and thus no comments from the local authority have been received to date.

If "NO" briefly explain why no comments have been received or why the report was not submitted if that is the case.

See explanation above.

C.3 Consultation with other stakeholders

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least **thirty (30) calendar days** before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?	NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

N/A

If "NO" briefly explain why no comments have been received

This Draft BA Report is currently out for a 30-day review period and thus no comments from the local authority have been received to date.

C.4 General public participation requirements

The Environmental Assessment Practitioner must ensure that the public participation process is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees and ratepayers associations. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was flawed.

The EAP must record all comments and respond to each comment of the public / interested and affected party before the application report is submitted. The comments and responses must be captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.

C.5 Appendices for public participation

All public participation information is to be attached in the appropriate Appendix. The information in this Appendix is to be ordered as detailed below:

Appendix 1	Proof of site notice
Appendix 2	Written notices issued as required in terms of the regulations
Appendix 3	Proof of newspaper advertisements – ***(will be included in the Final BA Report)***
Appendix 4	Communications to and from interested and affected parties
Appendix 5	Minutes of any public and/or stakeholder meetings – ***N/A***
Appendix 6	Comments and Responses Report – ***N/A at this stage of the process***
Appendix 7	Comments from I&APs on Basic Assessment (BA) Report - ***N/A at this stage of the process***
Appendix 8	Comments from I&APs on amendments to the BA Report – ***N/A at this stage of the process***
Appendix 9	Copy of the register of I&APs

Note from CSIR: Only the Public Participation documents that are pertinent to this stage of the process (i.e. Draft BAR phase) will be included in this version of the report. **All PPP documentation and proofs will thus be included in the Final BA Report** to be submitted to GDARD for decision making.

SECTION D: PUBLIC PARTICIPATION

Note: Section D is to be completed for the proposal and alternative(s) (if necessary)

Instructions for completion of Section D for alternatives

1) For each alternative under investigation, where such alternatives will have different resource and process details (e.g. technology alternative), the entire Section D needs to be completed
2) Each alterative needs to be clearly indicated in the box below
3) Attach the above documents in a chronological order

Section D has been duplicated for alternatives | **0** | times | (complete only when appropriate)

Section D Alternative No. | N/A | (complete only when appropriate for above)

D.1 Waste, effluent, and emission management

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? YES [redacted]

If yes, what estimated quantity will be produced per month? Approximately 25m^3

How will the construction solid waste be disposed of (describe)?

Anticipated construction solid waste to be produced includes building rubble, packaging material, overburden material and general litter from construction staff. It is recommended that construction waste/rubble will be collected and stored temporarily in designated containers for the different waste types, and thereafter disposed of at the nearest appropriate licensed waste disposal site.

Where will the construction solid waste be disposed of (describe)?

Waste will be disposed of at an appropriate licensed landfill site, possibly at the nearest landfill site to dispose of building rubble.

Will the activity produce solid waste during its operational phase? YES [redacted]

If yes, what estimated quantity will be produced per month? 50m^3

How will the solid waste be disposed of (describe)?

Solid waste generated during the operational phase, normal waste, constituting household rubbish and consumables, will be stored in suitable bins and transported to the nearest licenced disposal site. Broiler waste will be produced collectively when cleaning the facilities during each cycle which can be 3 to 6 months. This waste will be removed from the broiler facility and used as fertilizer in future when a crop garden is formed on the plot, but for now will be distributed as fertilizer to local farmers, at a later stage of the project it may be distributed to cattle farmers as feed.

The waste produced by the broiler facility (40 000 chickens) will be used as fertilizer, which will be created for the vegetables by method of a separation procedure, as described below. The recent increased interest in composting has arisen because of the need for environmentally sound waste treatment technologies. Composting is seen as an environmentally acceptable method of waste treatment. The stored manure will be treated, either before or during storage.
The reasons for treatment include:

- Odour control.
- Energy recovery.
- Reduction of manure volume—especially where extended transportation is necessary.
- Reduction of nutrient content—in some circumstances where insufficient land is available to receive the manure.
- Enhance (speed up) the decomposition of manure.

The process will involve separating liquid swine manure into its biosolid and liquid fractions. The process destroys pathogens, converts N from unstable ammonia to stable organic forms, reduces the volume of waste and improves the nature of the waste. The recommended upper limit for moisture content of substrates to be composted is reported to be 65%. However, composting may be feasible with initial moisture contents above 65% as long as there is enough air in the compost to satisfy the oxygen needs of the microbes.

Please note the GUIDELINE MANUAL FOR THE MANAGEMENT OF ABATTOIRS AND OTHER WASTE OF ANIMAL ORIGIN (GDARD, 2009) will be adhered to.

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?	NO

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

All waste generated, except for chicken manure (to be used as fertilizer or sold as fertilizer), cults and mortalities, will always be disposed of at a nearby registered disposal site.

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	NO

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

The majority of waste generated during the operational phase will be from chicken manure, cults and mortalities, as well as chicken bedding. Thus, it will be dried and processes to be used as fertilizer on the vegetables to be introduced on the farm at a later stage. In the meantime, the manure, cults and mortality waste will be dried in the attempt to be distributed as feed and fertilizer to local agricultural farms.

Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	[redacted] NO
If yes, what estimated quantity will be produced per month?	[redacted]
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)?	[redacted] NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	YES
If yes, what estimated quantity will be produced per month?	50m^3

If yes describe the nature of the effluent and how it will be disposed.

In the process of cleaning the broiler houses with a low toxicity biodegradable liquid will be used, this will result is a slurry mix of the liquid with parts of chicken manure and mortalities. This liquid will have little impact on the environment. The manure, cults and mortality waste will be dried in the attempt to be distributed as feed and fertilizer to local agricultural farms.

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility?	[redacted] NO

If yes, provide the particulars of the facility:

Facility name:	[redacted]
Contact person:	
Postal address:	
Postal code:	
Telephone:	
E-mail:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

N/A

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?	[redacted] NO
If yes, what estimated quantity will be produced per month?	[redacted]
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?	

Will the activity produce any effluent that will be treated and/or disposed of on site?	[redacted] NO

If yes describe how it will be treated and disposed off.

[redacted]

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	NO
If yes, is it controlled by any legislation of any sphere of government?	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the emissions in terms of type and concentration:

D.2 Water Use

Indicate the source(s) of water that will be used for the activity

municipal		groundwater	

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

Approximately 750 Kiloliters

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?	NO

If yes, list the permits required

If yes, have you applied for the water use permit(s)?	NO
If yes, have you received approval(s)? (attached in appropriate appendix)	NO

D.3 Power supply

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

Eskom/Ekurhuleni Metropolitan Municipality

If power supply is not available, where will power be sourced from?

D.4 Energy efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Water Pump:

- The borehole pumping system may make use of solar PV powered pumps, thus lessening the energy requirements.

Office buildings and pig houses:

- Use of building material originating from sensitive environmental resources should be minimised.
- Building material should be legally obtained by the supplier, e.g. wood must have been legally harvested, sand should be obtained only from legal borrow pits and from commercial sources.
- Building material that can be recycled/ reused should be used rather than building material that cannot.
- Use highly durable material for part of the building that is unlikely to be changed during the life of the buildings (unlikely to change due to e.g. renovation, fashion, changes in family life cycle) is highly recommended.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

SECTION E: RECOMMENDATION OF PRACTITIONER

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts as well as the impacts of not implementing the activity (Section 24(4)(b)(i).

E.1 Issues raised by interested and affected parties

Summarise the issues raised by interested and affected parties.

As noted above, this Draft BA Report is being released for a 30 day public comment period, in conjunction with the "project announcement (i.e. newspaper advertisements and letters to pre-identified stakeholders). Thus, no comments have been received by stakeholders at the time of the release of this report. All issues raised during the 30 day comment period on this Draft BA Report will be included in the Comments and Responses Report in the Final BA Report.

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included) (A full response must be provided in the Comments and Response Report that must be attached to this report):

As noted above, no issues/comments were raised by Interested and Affected Parties **prior** to the release of this Draft Basic Assessment Report. A full comments and Responses trail will be included in the Final BA Report, including a response from the EAP. This will be attached as **Appendix E5 in the Final BA Report.**

E.2 Impacts that may result from the construction and operational phase

Briefly describe the methodology utilised in the rating of significance of impacts

APPROACH TO THE BASIC ASSESSMENT

1) METHODOLOGY OF IMPACT ASSESSMENT

According to the DEA IEM Series guideline on "Impact Significance" (2002), there are a number of quantitative and qualitative methods that can be used to identify the significance of impacts resulting from a development. The process of determining impact significance should ideally involve a process of determining the acceptability of a predicted impact to society. Making this process explicit and open to public comment and input would be an improvement of the EIA/BA process. The CSIR's approach to determining significance is generally as follows:

- Use of expert opinion by the specialists ("professional judgement"), based on their experience, a site visit and analysis, and use of existing guidelines and strategic planning documents and conservation mapping (e.g. SANBI biodiversity databases);
- Review of specialist assessment by all stakeholders including authorities such as nature conservation officials, as part of the report review process (i.e. if a nature conservation official disagreed with the significance rating, then we could negotiate the rating); and
- Our approach is more a qualitative approach - we do not have a formal matrix calculation of significance as is

sometimes done.

2) SPECIALIST CRITERIA FOR IMPACT ASSESSMENT

The following methodology has been provided by the CSIR to all specialists, for incorporation into specialist assessments:

Assessment of Potential Impacts

The assessment of impact significance is based on the following conventions:

Nature of Impact - this reviews the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"

Spatial Extent - this should indicate whether the impact will be:
- Site specific;
- Local (<2 km from site);
- Regional (within 30 km of site); or
- National.

Duration - The timeframe during which (lifetime of) the impact will be experienced:
- Temporary (less than 1 year);
- Short term (1 to 6 years);
- Medium term (6 to 15 years);
- Long term (the impact will cease after the operational life of the activity); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

Intensity - it should be established whether the impact is destructive or innocuous and should be described as either:
- High (severe alteration of natural systems, patterns or processes such that they temporarily or permanently cease);
- Medium (notable alteration of natural systems, patterns or processes; where the environment continues to function but in a modified manner); or
- Low (negligible or no alteration of natural systems, patterns or processes); can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making.

Probability - this considers the likelihood of the impact occurring and should be described as:
- Improbable (little or no chance of occurring);
- Probable (<50% chance of occurring);
- Highly probable (50 – 90% chance of occurring); or
- Definite (>90% chance of occurring).

Reversibility - this considers the degree to which the adverse environmental impacts are reversible or irreversible. For example, an impact will be described as low should the impact have little chance of being rectified to correct environmental impacts. On the other hand, an impact such as the nuisance factor caused by noise impacts from wind turbines can be considered to be highly reversible at the end of the project lifespan. The assessment of the reversibility of potential impacts is based on the following terms:
- High - impacts on the environment at the end of the operational life cycle are highly reversible;
- Moderate - impacts on the environment at the end of the operational life cycle are reasonably reversible;
- Low - impacts on the environment at the end of the operational life cycle are slightly reversible; or
- Non-reversible - impacts on the environment at the end of the operational life cycle are not reversible and are consequently permanent.

Irreplaceability - this reviews the extent to which an environmental resource is replaceable or irreplaceable. For example, if the proposed project will be undertaken on land that is already transformed and degraded, this will yield a low irreplaceability score; however, should a proposed development destroy unique wetland systems for example, these may be considered irreplaceable and thus be described as high. The assessment of the degree to which the impact causes irreplaceable loss of resources is based on the following terms:
- High irreplaceability of resources (this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;

- Low irreplaceability of resources; or
- Resources are replaceable (this is the most favourable assessment for the environment).

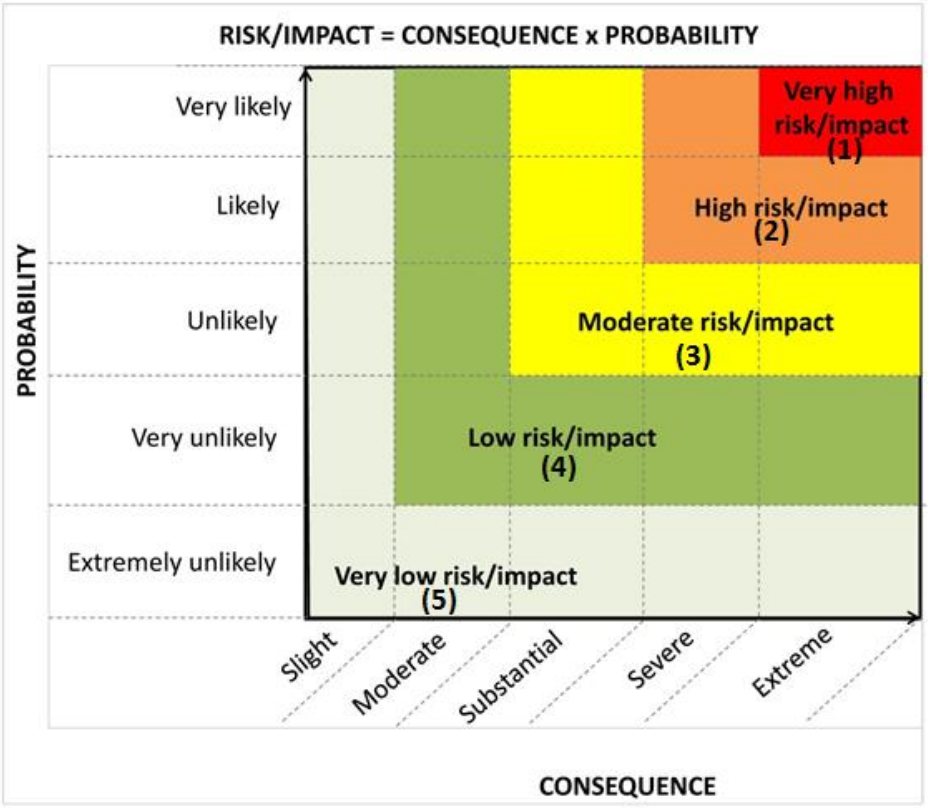


Figure 8: Guide to assessing risk/impact significance as a result of consequence and probability.

The status of the impacts and degree of confidence with respect to the assessment of the significance is stated as follows:

Status of the impact: A description as to whether the impact will be:
- Positive (environment overall benefits from impact);
- Negative (environment overall adversely affected); or
- Neutral (environment overall not affected).

Degree of confidence in predictions: The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as:
- High;
- Medium; or
- Low.

Based on the above considerations, the specialist provides an overall evaluation of the significance of the potential impact, which should be described as follows:
- **Low to very low:** the impact may result in minor alterations of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated;
- **Medium:** the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated; or
- **High:** Where it could have a "no-go" implication for the project unless mitigation or re-design is practically achievable.

Furthermore, the following must be considered:
- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.

- All impacts should be evaluated for the construction, operation and decommissioning phases of the project, where relevant.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.

Management Actions:
- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Where positive impacts are identified, augmentation measures will be identified to potentially enhance these.
- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

Monitoring:
Specialists should recommend monitoring requirements to assess the effectiveness of mitigation actions, indicating what actions are required, by whom, and the timing and frequency thereof.

Cumulative Impact:
Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Mitigation:
The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on the receiving environment and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potentially negative impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested.

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Note from the CSIR: Feasible site alternatives (i.e. location and property alternatives) do not exist for the proposed project. However, the No-Go alternative will be considered.

IDENTIFIED IMPACTS- CONSTRUCTION PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
ALTERNATIVE A1 (PREFERRED ALTERNATIVE)			
Direct impacts:			
Impact of project footprint on transformed vegetation and faunal habitat	Medium (Negative)	▪ Avoid the unnecessary loss of vegetation and faunal habitats and promote the re-establishment of indigenous vegetation in disturbed areas. ▪ Ensure that construction areas are well demarcated and restrict clearing of vegetation to minimize loss of vegetation and faunal habitats. ▪ Replant indigenous vegetation in disturbed areas. ▪ Relocate indigenous fauna to the nearest natural area.	**Low (Negative)**
Construction activities and vehicles impact on the occurrence and spread of alien plant species.	Low (Negative)	▪ Minimize the introduction and spread of existing invasive alien species during construction. Remove alien invasive species as per Alien and Invasive Species Regulations published in the Government Gazette No. 37886, 1 August 2014 ▪ Ensure that the prickly pear(an aggressive species) does not re-establish from remnants of the plant by carefully removing anf burning with no remnants remaining.	**Low (Negative)**
Dust and erosion caused by construction activities on ecosystem on the site	Medium (Negative)	Minimize dust and erosion by implementing effective measures, such as limiting the number of vehicles, people and materials to the construction site. ▪ Limit the number of vehicles on site, and keep within designated areas. ▪ Re-vegetate areas that will not be developed. ▪ Implement dust control measures such as adding mulch, and/ or periodically wetting the bare ground.	**Low (Negative)**
Sensory disturbance as a result of construction activities (incl. moving vehicles) on fauna	Medium (Negative)	▪ Reduce the duration of construction activities, reducing noise and light pollution that cause sensory disturbance on fauna. ▪ Construction can commence in winter in order to reduce the risk of disturbing active, and possibly breeding, faunal species (including migratory species). ▪ Limit construction activities to day time hours. ▪ Minimize or eliminate security and construction lights in order to reduce	**Low (Negative)**

IDENTIFIED IMPACTS- CONSTRUCTION PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		disturbance of any nocturnal fauna.	
Impact on the regional water balance as a result of increased water usage.	Low (Negative)	▪ Water is required during the construction phase for various purposes, such as earthworks, as well as to fulfil the requirements of construction personnel on-site. Where possible, water conservation should be practiced. Water conservation techniques include making construction personnel aware of the importance of limiting water wastage, as well as reducing water use during the cleaning of the site (such as sweeping the site before it is being washed). Ingwazi should also ensure that the water infrastructure on site is monitored for leakages on a regular basis to prevent wastage.	**Very Low (Negative)**
Potential spillage of effluent (from portable sanitation facilities for construction personnel).	Low (Negative)	▪ Normal sewage management practises should be implemented. These include ensuring that portable sanitation facilities are regularly emptied and the resulting sewage is transported safely (by an appointed (suitable) service provider) for correct disposal at an appropriate, licenced facility. Proof of disposal (in the form of waste disposal slips or waybills) should be retained on file for auditing purposes. ▪ As part of the Environmental Awareness Training, all construction personnel should be made aware of the sewage management practises.	**Very Low (Negative)**
Pollution caused by spillage or discharge of construction waste water into the surrounding environment.	Low (Negative)	▪ Ensure that adequate containment structures are provided for the storage of construction materials on site. ▪ Ensure the adequate removal and disposal of construction waste and material,	**Very Low (Negative)**
Air Quality Impact: Emissions from construction vehicles and generation of dust as a result of earthworks, demolition, as well as the delivery and mixing of construction materials.	Low (Negative)	▪ Ensure that cleared (excavated) areas and unpaved surfaces are sprayed with water (obtained from an approved source) to minimise dust generation. ▪ Approved soil stabilisers may be utilised to limit dust generation. ▪ Ensure that construction vehicles travelling on unpaved roads do not exceed a speed limit of 40 km/hour. ▪ Limit vehicles, people and materials to the construction site	**Low (Negative)**

IDENTIFIED IMPACTS- CONSTRUCTION PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		▪ Adequate dust control strategies should be applied to minimise dust deposition, for example: Periodic spraying of the entrance road and environmentally-friendly dust control measures (e.g. mulching and wetting) where and when dust is problematic ▪ Limit construction activities to day time hours.	
Socio-economic Impact: Employment creation and skills development opportunities during the construction phase, which is expected to give rise to approximately 6-10 new jobs.	Medium (Positive)	▪ Liaise with TNPA to maximise job creation opportunities during the construction phase. ▪ Enhance the use of local labour and local skills as far as reasonably possible. ▪ Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained. ▪ Ensure that an equitable percentage allocation is provided for local labour employment as well as specify the use of small-to-medium enterprises and training specifications in the Contractors contract. ▪ Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.	**Medium (Positive)**
Potential visual intrusion of construction/demolition activities on the views of sensitive visual receptors.	Low (Negative)	▪ No specific mitigation measures are required other than standard construction site housekeeping and dust suppression. These are included below: ▪ The contractor(s) should maintain good housekeeping on site to avoid litter and minimise waste. ▪ Litter and rubble should be timeously removed from the construction site and disposed at a licenced waste disposal facility. ▪ The project developer should demarcate construction boundaries and minimise areas of surface disturbance. ▪ Appropriate plans should be in place to minimise fire hazards and dust generation. ▪ Night lighting of the construction site should be minimised within requirements of safety and efficiency.	**Low (Negative)**
Potential noise impact from the use of construction equipment	Low (Negative)	▪ Limit construction activities to day time hours.	**Low (Negative)**

IDENTIFIED IMPACTS- CONSTRUCTION PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
(for the construction of the proposed infrastructure and demolition of existing infrastructure).			
Noise generation from demolition and construction work (e.g. grinding and use of angle grinders), as well as from the removal of waste material (e.g. crane and truck engines). This impact is rated as neutral.	Medium (Negative)	▪ Construction personnel must wear proper hearing protection, which should be specified as part of the Construction Phase Risk Assessment carried out by the Contractor. ▪ The Contractor must ensure that all construction personnel are provided with adequate Personal Protective Equipment (PPE), where appropriate.	**Low (Negative)**
Potential health injuries to construction personnel as a result of construction work (i.e. welding fumes	Medium (Neutral)	▪ The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate.	**Low (Neutral)**
Traffic, congestion and potential for collisions during the construction phase.	Low (Negativel)	▪ During the construction phase, suitable parking areas should be created and designated for construction trucks and vehicles. ▪ A construction supervisor should be appointed to co-ordinate construction traffic during the construction phase (by drawing up a traffic plan prior to construction). ▪ Road barricading should be undertaken where required and road safety signs should be adequately installed at strategic points within the construction site.	**Low (Negative)**
Indirect impacts:			
Socio-economic impact: Secondary industries may benefit from the proposed project in the form of the provision of produce and poultry products.	Low (Positive)	▪ Ensure that local industries are utilised as suppliers, where applicable/practical.	**Medium (Positive)**
Cumulative impacts:			
As explained above for each identified impact.			

No-go alternative
Direct impacts:

- None of the impacts mentioned above will occur.
- The existing site will remain uncleared which will result in no clearance of indigenous vegetation and in addition, no clearance of present alien species.
- If the proposed project does not proceed, increased income and economic spin-off activities will not be realised.
- Approximately 6-10 new jobs will not be created during the construction phase.
- Customers of the broiler facility will not be provided with an increase of poultry products on a local scale.
- If the proposed project does not proceed, the industries that rely on the supply of fresh poultry products, could experience hindered economic growth potential.

Indirect impacts:

- There are no indirect impacts during the construction phase for the No-go Option.

Cumulative impacts:

- There are no cumulative impacts during the construction phase for the No-go Option.

IDENTIFIED IMPACTS- OPERATIONAL PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
ALTERNATIVE A1 (PREFERRED ALTERNATIVE)			
Direct impacts:			
Sensory disturbance on the fauna as a result of noise, lights and dust from the chicken houses	Medium (Negative)	▪ Minimize sensory disturbance of fauna by preventing unnecessary light and noise pollution, especially on nocturnal animals. ▪ Reduce the essential lighting by ensuring that all outdoor lights are fitted with caps or that they are angled downwards ▪ Ensure that Ultraviolet filtered lights are installed so that warmer, long-wavelength light is emitted to reduce insect attraction. ▪ Ensure that the machinery and ventilation systems emit a low noise.	**Low (Negative)**
Environmental contamination as a result of handling of chicken waste	Medium (Negative)	▪ Environmental contamination can be avoided by ensuring that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment. Furthermore, that there is appropriate control measures in place for any contamination event. ▪ Ensure that the facility is designed in accordance with international best practice norms and standards, and with advice from an appropriate engineering specialist, to ensure that there is no environmental contamination from effluent, fodder, carcasses and other waste. ▪ Adhere to best practice chicken husbandry and waste disposal norms as outlined in the National Environmental Management Waste Act (NEM:WA)(Act 59 of 2008). ▪ Ensure that all waste (including hazardous waste) should be disposed of at an appropriate licensed facility. ▪ Establish appropriate emergency procedures for accidental contamination of the surrounding environment. Rehabilitate contaminated areas as soon as possible in accordance with advice from appropriate contamination and environmental specialists. ▪ Designate a secure and access restricted room for storage of potentially hazardous substances, with appropriate and clear signage. ▪ Ensure that workers are educated with regards to the handling of hazardous substances and	**Low (Negative)**

IDENTIFIED IMPACTS- OPERATIONAL PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		other waste management including emergency procedures.	
Animal pests as a result of inappropriate handling of chicken waste and poor hygiene conditions in handling the chickens leading to increased breeding of animal pest.	Medium (Negative)	▪ Ensure that effective pest control that does not affect non-target animals by controlling access and proliferation of pests as far as possible. ▪ Ensure that the chicken houses have sufficient ventilation to keep floors, bedding and fodder as dry as possible and clean floors regularly and prevent unwanted animal access to the fodder. ▪ Ensure that the areas surrounding the chicken facility is free of spilled manure and litter. Inspect and clear litter and waste from the site. ▪ Keep weeds and grass mowed to 5 cm or less in the immediate surrounding outside the facilities to reduce prevalence if insects. ▪ Ensure effective sanitation and rodent proofing and humane extermination of rodents ▪ Make use of appropriate devices and traps to kill flies, such as sticky tapes, baited traps, and use natural alternatives for pest control, rather than chemicals. ▪ Ensure that pest control measures are restricted to problematic areas, and ensure these measures are taxon-specific, in order to avoid unnecessary extermination of non-pest fauna.	**Low (Negative)**
Diseases as a result of poor chicken waste management and/or prevalence of pests leading to a change in population of native fauna	Medium (Negative)	▪ Avoid transmission of diseases to remaining fauna. ▪ Ensure that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment. ▪ Ensure that there are appropriate control measures in place for any contamination event. ▪ Control the access and proliferation of pests as far as possible.	**Low (Negative)**
Increased municipal water usage as a result of domestic uses in the facility.	Medium (Negative)	▪ The amount of potable water required (for drinking purposes) is considered to be small. Therefore, increased demand on municipal water services as a result of the proposed project is considered to be small. However, water conservation should still be practiced during the operational phase. ▪ Water conservation techniques include making operational personnel aware of the importance of limiting water wastage, as well as reducing	**Low (Negative)**

IDENTIFIED IMPACTS- OPERATIONAL PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		water use during the cleaning of the facility (such as sweeping the site before it is being washed). Ingwazi should also ensure that the water infrastructure on site is monitored for leakages on a regular basis to prevent wastage. Ingwazi should consider installing water saving devices (e.g. dual flush toilets, automatic shut-off taps, etc.).	
Increased water usage as a result of abstraction from the borehole for the operation of the broiler facility.	Medium (Negative)	▪ Water conservation should still be practiced during the operational phase. This includes water saving techniques during irrigation as well as conservative irrigation practices. ▪ Irrigation systems, borehole abstraction devices and water tanks for storage should be inspected regularly so as to insure there are no leakages.	**Low (Negative)**
Increased stormwater discharge into the surrounding environment.	Low (Negative)	▪ A suitable stormwater/surface water quality monitoring programme should be established and implemented. ▪ Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds. ▪ Monitoring programmes should be implemented to ensure that no materials enter the surface water drainage system.	**Low (Negative)**
Air Quality Impact: Increased odours resulting from the broiler facility.	High (negative)	▪ Ensure that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the air quality of the receiving environment.	**Medium (negative)**
Socio-economic Impact: Skills development opportunities and economic spin off activities.	Medium (Positive)	▪ Enhance the use of local labour and local skills as far as reasonably possible. ▪ Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained. ▪ Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.	**High (Positive)**
Potential re-establishment of alien plants on site.	Low (Negative)	▪ Ensure that any alien invasive plants that become re-established on site are removed promptly. The removal of these species must be carried out in line with relevant municipal and provincial procedures, guidelines and recommendations. ▪ ▪ The removed alien invasive vegetation should be immediately disposed of correctly and	**Low (Negative)**

IDENTIFIED IMPACTS- OPERATIONAL PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		should not be kept on site for prolonged periods of time, as this will enhance the spread of these species.	
Improved service delivery with regards to produce and poultry products.	Medium (Positive)	▪ Ensure that the proposed infrastructure is maintained appropriately to ensure that all facilities and infrastructure operate within its design capacity to deliver as the market requires.	**Medium (Positive)**
Potential visual intrusion of structures and buildings associated with the proposed development on existing views of sensitive visual receptors.	Low (Negative)	▪ Ensure facility is kept tidy and no decay of chicken houses occurs. ▪ Ensure that building by-laws are adhered to.	**Low (Negative)**
Potential impact on the health of operating personnel resulting in potential health injuries. This impact is rated as neutral.	Medium (Negative)	▪ Operational personnel must wear basic PPE (e.g. gloves, goggles etc.) as necessary during the operational phase.	**Low (Negative)**
Minor accidents to the public and moderate accidents to operational staff (e.g. fires). This impact is rated as neutral.	Medium (Negative)	▪ An Emergency Plan should be compiled in order to deal with potential spillages and fires. Records of practices should be kept on site. ▪ Scheduled inspections should be implemented by operating personnel in order to assure and verify the integrity of hoses etc. ▪ Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the facility as required.	**Low (Negative)**
Impact of extra operational vehicles on the road network.	Low (Negative)	▪ Undertake re-calibration of existing traffic signals if required.	**Low (Negative)**
Indirect impacts:			
Socio-economic impact: Secondary industries may benefit from the proposed project in the form of the provision of produce and poultry products.	Low (Positive)	▪ Ensure that local industries are utilised as suppliers, where applicable/practical.	**Medium (Positive)**
Cumulative impacts:			
As explained above.			

No-go alternative

Direct impacts:

- None of the impacts mentioned above will occur.
- The existing site will remain uncleared which will result in no clearance of indigenous vegetation and in addition, no clearance of present alien species.
- If the proposed project does not proceed, increased income and economic spin-off activities will not be realised.
- Approximately 6-10 new jobs will not be created during the construction phase.
- Customers of the proposed broiler facility will not be provided with an increase of poultry products on a local scale.
- If the proposed project does not proceed, the industries that rely on the supply of fresh poultry products, could experience hindered economic growth potential.

Indirect impacts:

- There are no indirect impacts during the construction phase for the No-go Option.

Cumulative impacts:

- There are no cumulative impacts during the construction phase for the No-go Option.

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

Ecological Specialist Study: Basic Assessment of the Proposed Expansion of a Chicken Broiler Facility on Smallholding 74 Dahlia Road, Welgedacht A.H.,Springs, Gauteng.

This report is attached as **Appendix G.**

Describe any gaps in knowledge or assumptions made in the assessment of the environment and the impacts associated with the proposed development.

The following assumptions and limitations are applicable to the Ecological study:

- The ecological assessment was conducted within the boundaries of the proposed project area, and excluded the neighbouring and adjacent properties; these were, however, considered as part of the desktop assessment;
- Most of the floral and faunal communities have been considered and assessed accurately, however, some aspects may have been unknowingly overlooked because of the dynamic nature of ecosystems;
- The increased level of surrounding anthropogenic activities and the nature and behaviour of most faunal taxa may have affected the number of species that were observed during the site visit. The site observations were also supplemented by information obtained from the literature/desktop study where necessary;
- The data presented in this report are based on a single site visit, undertaken in summer on 30 November 2017 by Rirhandzu Marivate and Babalwa Mqokeli of the CSIR;
- A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was supplemented with all available desktop data;
- No formal consultation process was undertaken, apart from consulting with the project development/ land owner as well as the process undertaken as part of the formal Basic Assessment process (CSIR, 2018); and
- Due to the limited time spent on site and the date of the site visit, the absence of species on site does not mean that the species is not present at the site. Another site visit at a different time of the year e.g. during or following the summer rains could lead to the identification of other faunal and floral species and result in additional observations for the site.

E.3 Impacts that may result from the decommissioning and closure phase

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

IDENTIFIED IMPACTS- DECOMISSIONING AND CLOSURE PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
ALTERNATIVE A1 (PREFERRED ALTERNATIVE)			
Direct impacts:			
Impact of decommissioning and removal of facilities on fauna and flora on site	Medium (Negative)	▪ Promote the re-establishment of indigenous vegetation in disturbed areas and minimize introduction and spread of invasive alien vegetation. ▪ Plant only locally indigenous flora if landscaping is required.	**Medium (Negative)**
Potential spillage of effluent to the surrounding environment (from portable sanitation facilities for decommissioning personnel).	Medium (Negative)	▪ Normal sewage management practises should be implemented. These include ensuring that portable sanitation facilities are regularly emptied and the resulting sewage is transported safely (by an appointed service provider) for correct disposal at an appropriate, licenced facility. Proof of disposal (in the form of waste disposal slips or waybills) should be retained on file for auditing purposes.	**Low (Negative)**
Discharge of contaminated stormwater into the surrounding environment. Contamination could result from chemicals, oils, fuels, sewage, solid waste, litter etc.	Medium (Negative)	▪ The appointed Contractor should compile a Method Statement for Stormwater Management during the decommissioning phase. ▪ Provide secure storage for oil, chemicals and other waste materials to prevent contamination of stormwater runoff.	**Low (Negative)**
Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste.	Medium (Negative)	▪ General waste (i.e. building rubble, demolition waste, discarded concrete, bricks, tiles, wood, glass, plastic, metal, excavated material, packaging material, paper and domestic waste etc.) and hazardous waste (i.e. empty tins, paint and paint cleaning liquids, oils, fuel spillages and chemicals etc.) generated during the decommissioning phase should be stored temporarily on site in suitable (and correctly labelled) waste	**Low (Negative)**

IDENTIFIED IMPACTS- DECOMISSIONING AND CLOSURE PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
		collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate. ▪ Should the on-site storage of general waste and hazardous waste exceed 100 m^3 and 80 m^3 respectively, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under GN 926) must be adhered to. ▪ Ensure that general waste and hazardous waste generated are removed from the site on a regular basis and disposed of at an appropriate, licensed waste disposal facility by an approved waste management Contractor.	
Air Quality Impact: Emissions from decommissioning vehicles and generation of dust as a result of earthworks and demolition.	Low (Negative)	▪ Ensure that cleared (excavated) areas and unpaved surfaces are sprayed with water (obtained from an approved source) to minimise dust generation. ▪ Approved soil stabilisers may be utilised to limit dust generation. ▪ Ensure that decommissioning vehicles travelling on unpaved roads do not exceed a speed limit of 40 km/hour.	**Low (Negative)**
Potential visual intrusion of decommissioning activities on the existing views of sensitive visual receptors.	Low (Negative)	▪ No specific mitigation measures are required other than standard site housekeeping and dust suppression. These are included below: ▪ The contractor(s) should maintain good housekeeping on site to avoid litter and minimise waste. ▪ Litter and rubble should be timeously removed from the work site and disposed at a licenced waste disposal facility. ▪ The project developer should demarcate decommissioning boundaries and minimise areas of surface disturbance. ▪ Appropriate plans should be in place to minimise fire hazards and dust generation. ▪ Night lighting of the decommissioning site should be minimised within requirements of safety and efficiency.	**Low (Negative)**
Noise generation from demolition activities (e.g. grinding, steel	Medium (Negative)	▪ A method statement, including detailed procedures, must be drawn up prior to any decommissioning of existing tanks.	**Low (Negative)**

IDENTIFIED IMPACTS- DECOMISSIONING AND CLOSURE PHASE			
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**PROPOSED MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
falling, use of angle grinders) during the decommissioning phase.		▪ Decommissioning personnel must wear proper hearing protection, which should be specified as part of the Decommissioning Phase Risk Assessment carried out by the Contractor. ▪ The Contractor must ensure that all decommissioning personnel are provided with adequate PPE, where appropriate.	
Potential health injuries to demolition staff during the decommissioning phase.	Medium (Negative)	▪ The Contractor must ensure that all decommissioning personnel are provided with adequate PPE for use where appropriate.	**Low (Negative)**
Heavy traffic, congestion and potential for collisions.	Medium (Negative)	▪ Suitable parking areas should be created and designated for trucks and vehicles. ▪ A supervisor should be appointed to co-ordinate traffic during the decommissioning phase. ▪ Road barricading should be undertaken where required and road safety signs should be adequately installed at strategic points within the site.	**Low (Negative)**
Pollution of the surrounding water and ground as a result of spillages, generation of building rubble and waste scrap material.	High (Negative)	▪ The amount of hazardous materials and liquids (such as cleaning materials) handled will be minimal. Fumes generated during welding will be minimal, within a well-ventilated area. ▪ All demolition waste (including rubble) should be frequently removed from site and correctly disposed by a suitable waste Contractor. ▪ The work area should be cleaned regularly. ▪ Contractor should provide adequate waste skips (or similar) on site and the contract should specify that the Contractor must be responsible for the correct disposal of the contents of the waste skips.	**Low (Negative)**
Cumulative impacts:			
As described above.			

List any specialist reports that were used to fill in the above tables. Such reports are to be attached in the appropriate Appendix.

Ecological Specialist Study: Basic Assessment of the Proposed Expansion of a Chicken Broiler Facility on Smallholding 74 Dahlia Road, Welgedacht A.H.,Springs, Gauteng.

This report is attached as **Appendix G.**

Where applicable indicate the detailed financial provisions for rehabilitation, closure and ongoing post decommissioning management for the negative environmental impacts.

N/A

E.4 Cumulative impacts

Describe potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment. Substantiate response:

Cumulative impacts that may arise from the proposed project

Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact. Figure 9 below highlights an example of how cumulative impacts manifest in the environment due to the impacts resulting from numerous developments on given spatial scale.

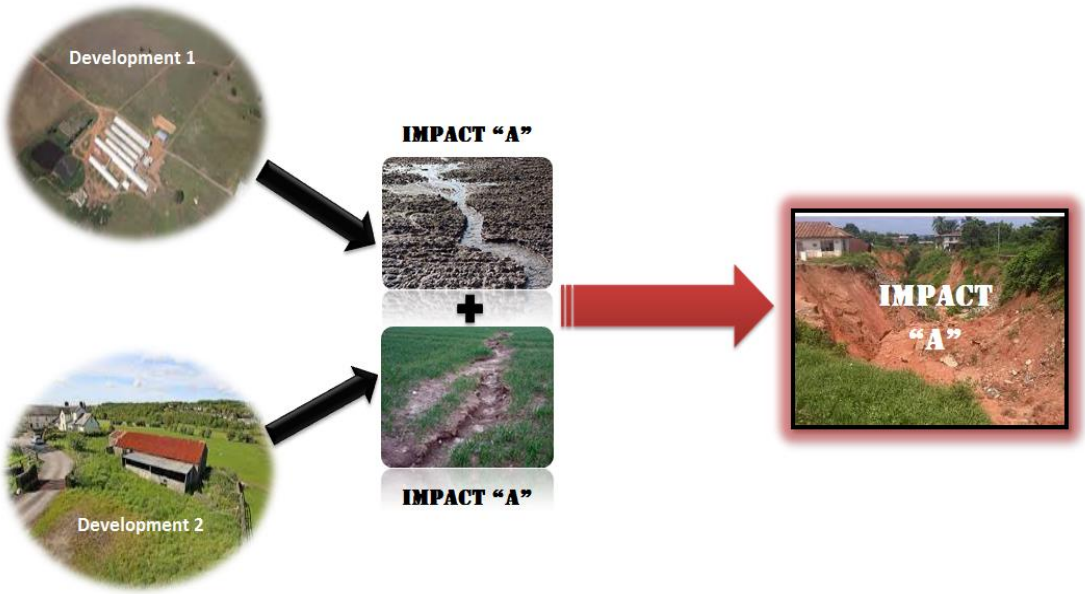


Figure 9: Schematic diagram indicating an example of a cumulative impact

Cumulative Impacts which could result from the proposed project are described below (**Negative):**

- Cumulative hectares of transformed indigenous vegetation and faunal habitat;
- Cumulative impact of construction activities (including movement of vehicles) on occurrence and spread of alien plant species;
- Cumulative increase of dust and erosion caused by construction activities on ecology on the site;
- Cumulative increase in sensory disturbance as a result of construction activities (incl. vehicles) on fauna;
- Cumulative impact on the fauna as a result of noise, lights and dust from the chicken houses leading to sensory disturbance;
- Cumulative potential visual intrusion of activities on the existing views of sensitive visual

receptors.
- Cumulative impact on the regional water balance as a result of increased water usage.

The following are the anticipated **positive** cumulative impacts:
- Cumulative benefits in the form of the provision of produce and poultry products and iimproved service delivery with regards to produce and poultry products.
- Cumulative skills development opportunities and economic spin off activities.

All the cumulative impacts above are rated as **Low** after mitigation. The management actions described in the tables above also apply to cumulative impacts.

E.5 Environmental impact statement

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impact that the proposal and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Proposal

Proposed activity: Development of proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng.

The development of a chicken broiler facility and associated infrastructure measuring around 1 ha in size will exert an impact on the environment; but based on the findings of the Ecological Impact Assessment (Appendix G), and as per the ecologist recommendation and the locality of the site, the impacts associated with this proposed development can be **mitigated to an acceptable level (Low).**

The creation of temporary and permanent job opportunities in the Welgedacht A.H. area will have a positive impact on the surrounding community. The increase in the production of food products in the region is also viewed as a positive impact. With the implementation of the mitigation measures suggested in this report and based on the information available to date, the site visit undertaken, it is the EAP's opinion that there are no fatal flaws to the project, provided the mitigation set out is adhered to and that the developer shows commitment to the sustainable development.

Alternative 1

[redacted]

Alternative 2

[redacted]

No-go (compulsory)

This option assumes that a conservative approach would ensure that the environment is not impacted upon any more than is currently the case. It is important to state that this assessment is informed by the current condition of the area. Should the Competent Authority decline the application, the 'No-Go' option will be followed and the status quo of the site will remain.

E.6 Impact summary of the proposal or preferred alternative

For proposal:

IMPACT SUMMARY- CONSTRUCTION PHASE		
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
Impact of project footprint on transformed vegetation and faunal habitat	Medium (Negative)	Low (Negative)
Construction activities and vehicles impact on the occurrence and spread of alien plant species.	Low (Negative)	Low (Negative)
Dust and erosion	Medium (Negative)	Low (Negative)
Sensory disturbance on fauna	Medium (Negative)	Low (Negative)
Impact on the regional water balance as a result of increased water usage.	Low (Negative)	Very Low (Negative)
Potential spillage of effluent	Low (Negative)	Very Low (Negative)
Pollution caused by spillage or discharge of construction waste water	Low (Negative)	Very Low (Negative)
Air Quality Impact: Emissions from construction vehicles and generation of dust.	Low (Negative)	Low (Negative)
Socio-economic Impact: Employment creation and skills development opportunities	Medium (Positive)	Medium (Positive)
Potential visual intrusion of construction/demolition activities on the views of sensitive visual receptors.	Low (Negative)	Low (Negative)
Potential noise impact from the use of construction equipment	Low (Negative)	Low (Negative)
Noise generation from demolition and construction work	Medium (Negative)	Low (Negative)
Potential health injuries to construction personnel	Medium (Negative)	Low (Negative)
Traffic, congestion and potential for collisions during the construction phase.	Low (Negative)	Low (Negative)
Impact of project footprint on transformed vegetation and faunal habitat	Medium (Negative)	Low (Negative)
Socio-economic impact: Secondary industries may benefit from the proposed project in the form of the provision of produce and poultry products.	Low (positive)	Medium (Positive)

IMPACT SUMMARY- OPERATIONAL PHASE		
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
Sensory disturbance on the fauna	Medium (Negative)	Low (Negative)
Environmental contamination as a result of handling of chicken waste	Medium (Negative)	Low (Negative)

IMPACT SUMMARY- OPERATIONAL PHASE		
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
Animal pests as a result of inappropriate handling of chicken waste and poor hygiene conditions	Medium (Negative)	Low (Negative)
Diseases as a result of poor chicken waste management and/or prevalence of pests	Medium (Negative)	Low (Negative)
Increased municipal water usage as a result of domestic uses in the facility.	Medium (Negative)	Low (Negative)
Increased water usage as a result of abstraction from the borehole	Medium (Negative)	Low (Negative)
Increased stormwater discharge into the surrounding environment.	Low (Negative)	Low (Negative)
Air Quality Impact: Increased odours resulting from the broiler facility.	High (negative)	Medium (negative)
Socio-economic Impact: Skills development opportunities and economic spin off activities.	Medium (Positive)	High (Positive)
Potential re-establishment of alien plants on site.	Low (Negative)	Low (Negative)
Improved service delivery with regards to produce and poultry products.	Medium (Positive)	Medium (Positive)
Potential visual intrusion of structures and buildings	Low (Negative)	Low (Negative)
Potential impact on the health of operating personnel	Medium (Negative)	Low (Negative)
Minor accidents to the public and moderate accidents to operational staff (e.g. fires).	Medium (Negative)	Low (Negative)
Impact of extra operational vehicles on the road network.	Low (Negative)	Low (Negative)
Socio-economic impact: Secondary industries may benefit from the proposed project in the form of the provision of produce and poultry products.	Low (Positive)	Medium (Positive)

IMPACT SUMMARY- CLOSURE PHASE		
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
Impact of decommissioning and removal of facilities on fauna and flora on site	Medium (Negative)	Medium (Negative)
Potential spillage of effluent	Medium (Negative)	Low (Negative)
Discharge of contaminated waste	Medium (Negative)	Low (Negative)
Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste.	Medium (Negative)	Low (Negative)
Air Quality Impact: Emissions from decommissioning vehicles and generation of dust.	Low (Negative)	Low (Negative)
Potential visual intrusion of decommissioning activities	Low (Negative)	Low (Negative)
Noise generation from demolition activities	Medium (Negative)	Low (Negative)
Potential health injuries to demolition staff during the	Medium (Negative)	Low (Negative)

IMPACT SUMMARY- CLOSURE PHASE		
IMPACT	**SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION**	**SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION**
decommissioning phase.		
Heavy traffic, congestion and potential for collisions.	Medium (Negative)	Low (Negative)
Pollution of the surrounding water and ground	High (Negative)	Low (Negative)

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

As mentioned above under "Alternatives", this proposed project is the development of a chicken broiler facility and associated infrastructure. These developments will be according to best guidelines when it comes to broiler farming within the environmental legislation and ensuring minimal environmental impacts.

As mentioned previously, this project falls under the DEA-CSIR's "Special Needs and Skills Development Programme". Thus, it is not feasible for the relocating of the proposed chicken broiler site as firstly, this is the only available land to the applicant; secondly there is an existing enterprise on this site in which the applicant is engaged in. This has also resulted in a large infestation in alien species and a degraded site (see Appendix G). The site further ensure minimal biosecurity threats to the chicken broiler facility where there is controlled access by people as well as other animals, by this preventing pests and transmission of infections posing a threat to the poultry.

E.7 Spatial development tools

Indicate the application of any spatial development tool protocols on the proposed development and the outcome thereof.

1) **INTEGRATED DEVELOPMENT PLAN (IDP) OF CITY OF EKURHULENI 2017/18 TO 2020/21**

The City has a long term development strategy referred to as the Ekurhuleni Growth and Development Strategy 2055 (GDS 2055). The strategy systematically analyses Ekurhuleni's history and its development challenges, wherein it therefore outlines the desired growth and development trajectory. It seeks to ensure that Ekurhuleni transitions from being a fragmented City to being a Delivering City from 2012 to 2020, a Capable City from 2020 – 2030 and lastly a Sustainable City from 2030 to 2055.

The GDS has identified five strategic themes to incrementally measure the success of the City with respect to the above. These are long-term outcomes that have been designed to incrementally measure the success of the City in achieving the objectives of the GDS 2055:

a) Re-urbanise in order to achieve sustainable urban integration;
b) Re-industrialise in order to achieve job creating economic growth;
c) Re-generate in order to achieve environmental well-being;
d) Re-mobilise in order to achieve social empowerment; and
e) Re-govern in order to achieve effective cooperative governance.

In order to achieve targets (b) and (d), food security was highlighted as a major goal. The EMM's strategy is to strengthen food security and agriculture competitiveness, while lifting marginalized and rural households out of poverty by investing in required infrastructure, services, skills and productivity. Increase job creation in the rural areas (agriculture economy) and reduce the percentage of households who are vulnerable to hunger. The key focus areas in order to achieve the goals within these staregic themes above as are follows:

- Implementation of the 10-point economic revival plan towards building an inclusive economy:
  - Aerotropolis Master Plan Implementation;
  - Manufacturing revitalization;
  - Enabling public transport system;
  - Acceleration of the Spatial Economic Zones (SEZ) and Industrial Development Zones(IDZ) programme;
  - Land availability for strategic development;
  - Implementation of township economies strategy;
  - **Support of SMMEs** through public procurement;
  - Massive infrastructure investment;
  - **Promote localization and production;** and
  - Skills and capability development and institutional stabilization.
- Upgrading and renaming of the Springs Fresh Produce Market;
- Implementation of the Vukuphile Programme;
- Implementation of the Mintirho Community Empowerment Programme;
- Improve Local Economic Development through Seed Funding (Grant in Aid);
- Implement the Agricultural Development programme;
- Increase investment attraction;
- Implementation of the City of Ekurhuleni Tourism.

The alignment of the proposed project with the key focus areas above and the goals of the IDP have been carefully considered in the assessment of the viability of this project.

2) EKURHULENI METROPOLITAN MUNICIPALITY REGIONAL SPATIAL DEVELOPMENT FRAMEWORK: REGION D (2015)

A Spatial Development Framework (SDF) provides the framework for making resource-effective decisions. It can be a powerful lever for transforming cities and is instrumental in the realisation of a city's vision. Furthermore, it is a guide that can have an impact on the development of a city over the next 15 years and more if properly conceived and systematically executed. Thus, the purpose of the compilation of a SDF for Region D is to present a clear strategic vision for the future spatial growth of the region.

The socio-economic and spatial challenges created by the amalgamation of the nine towns and the 11 local administrations called for a strategic long term response. Hence, the EMM embarked on a process to formulate a long term development strategy in 2004. This gave rise to the Growth and Development Strategy 2025, which has subsequently been reviewed and in 2012 the Growth and Development Strategy 2055 (GDS) was adopted. In conjunction with the GDS, the Metropolitan Spatial Development Framework (MSDF) and the Regional Spatial Development Frameworks (RSDFs) are plans outlining the desired spatial development of the metropolitan area as contemplated in terms of Section 25(e) of the Local Government Municipal Systems Act (Act 32 of 2000).

A broad overview of the environmental constraints within the EMM indicates that approximately 60% of the municipality contains ecologically important areas, sensitive surface and hydrological features, high potential agricultural land and/or potential pollution sources. Region D is constrained by 64.33% of environmental aspects (indicated in red on Plan 21) within the region, which equates to 12.65% of the EMM. This however does not hinder development but rather affects the type of development that can occur within the environmentally constrained areas.

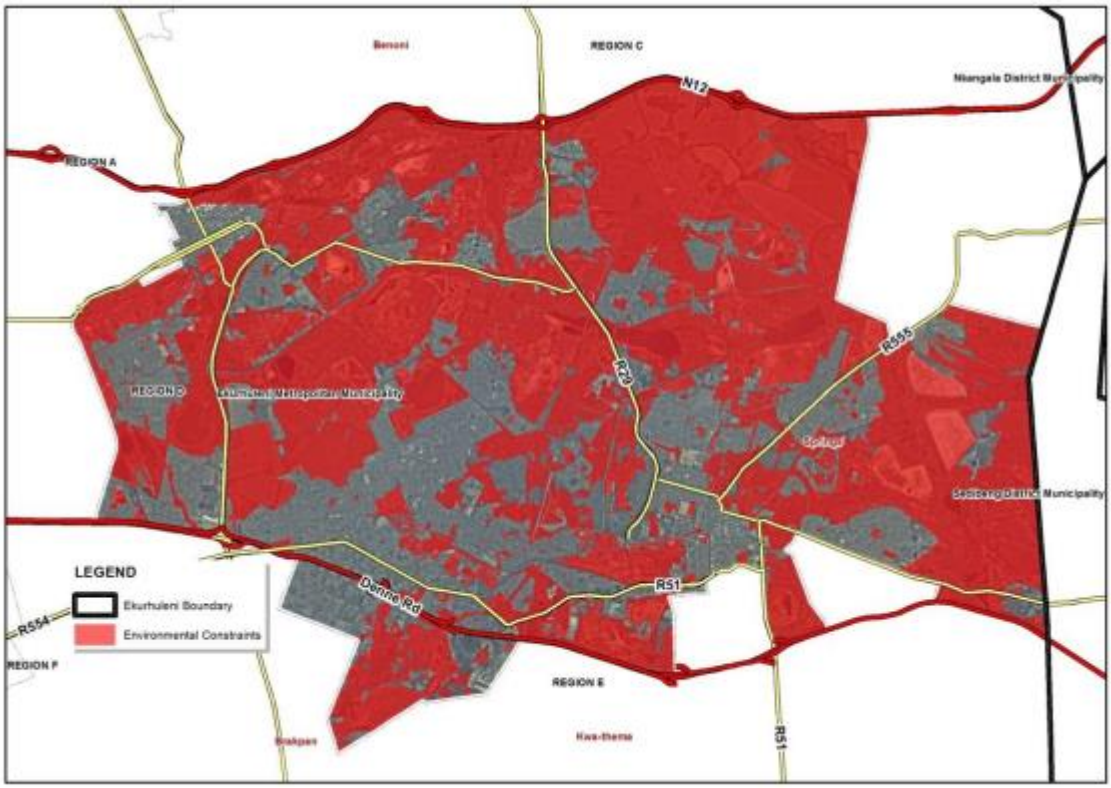


Figure 10: Areas with development constraints in Region D (SDF, 2015)

Approximately 3 050.98 ha of high potential agricultural land in Region D is not used for agricultural activities and approximately 1 860.67 ha of high potential agricultural land is so used. Of the moderate potential agricultural land, 70.72 ha is used and 3 775.07 ha is not used for agricultural activity. Currently 38% of Region D's high potential agricultural land is used for agricultural activities. However the Springs and northern Brakpan area comprises 3 050 ha of high potential agricultural land and 3 775 ha of moderate potential agricultural land not being used. These areas provide an opportunity for the promotion of more intensive agricultural development and economic growth in the region. In addition to the above, part of the Lesedi Agricultural Hub is situated in Region D.

The SDF highlights that the function of Region D is to:

- ensure that urban densification occurs along the rail infrastructure alignment in order to maximise on the opportunities offered by the existing rail network;
- provide north-south linkages such as the proposed PWV 17, as this will enable better connectivity and integration within the EMM and beyond;
- protect the open spaces, these areas include watercourses and pans;
- **maximise on the agricultural potential of the area where possible;**
- make provision for the upgrade and maintenance of certain urban areas to adapt and accommodate changing circumstances in the region;
- retain the existing industrial component and expand on the opportunities offered by these areas;
- provide sufficient social services (social and infrastructure) to accommodate the needs of the growing population;
- capitalise on the N12 and N17 transportation routes; and
- retrofit existing urban nodes as regional activity nodes with strong residential functions and the supporting land uses required by high density residential development.

As mentioned above, based on the natural resources such as water availability, geology, soil potential,

climate and proximity to towns, five development zones were identified. The zones also take into consideration the demand for land by the previously disadvantaged and the benefit gained. The zone in which this proposed project falls was identified for "urban farms", which included **chicken broiler production** (Table 13 "Agricultural guidelines", EMM SDF, 2015).

E.8 Recommendation of the practitioner

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner as bound by professional ethical standards and the code of conduct of EAPASA).

YES [redacted]

If "NO", indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

[redacted]

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

Please see the Environmental Management Programme (EMPr) attached as **Appendix H** for further detail on mitigation measures. These are summarised as follows:

1. Restrict all habitat loss and disturbances from construction activities to within the proposed and agreed upon site layout.
2. Adhere to law and best practice guidelines regarding the displacement of CI and medicinally important floral species.
3. Limit indiscriminate killing, persecution or hunting of fauna.
4. Regulate / limit access by potential vectors of alien plants.
5. By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit.
6. Ensure that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment.
7. Detect and control pest infestations before they become a problem through frequent and careful cleaning, monitoring and control.
8. Harvesting of indigenous flora for medicine, fire wood, building materials, and other purposes must be prohibited.
9. Ensure that flammable materials are stored in an appropriate safe house. Ensure that there are appropriate control measures in place for any accidental fires. If artificial burning is considered necessary to reduce risks to human and infrastructure safety from wild fires, a fire management plan should be compiled with input from an appropriate floral specialist, and diligently implemented. Annual wild fires should be strictly prohibited.
10. Limit the effects of noise associated disturbances from chickens and operational activities on sensitive fauna.
11. A site specific Stormwater Management Plan must be designed and implemented which includes appropriate attenuation facilities on site.
12. Erosion control measures must be implemented (Including appropriate attenuation facilities).
13. Conservation orientated clauses should be built into contracts for construction personnel, complete with

penalty clauses for non-compliance.

14. During the construction phase there will be increased surface water runoff and a decreased water quality (with increased silt load and pollution). Completing construction during the winter months would help mitigate the environmental impact.
15. The monitoring of the construction site must be carried out by a qualified Environmental Compliance Officer (ECO) with proven expertise in the field so as to ensure compliance to the Environmental Management Programme (EMPr)
16. All mitigation measures listed in the BAR as well as the EMPr must be implemented and adhered to.
17. Mitigation measures and strict waste management should ensure the prevention of groundwater contamination on site.

E.9 The needs and desirability of the proposed development

(as per notice 792 of 2012, or the updated version of this guideline)

NEED AND DESIRABILITY OF THE PROPOSED PROJECT		
Questions (Notice 792, NEMA, 2012)		**Answer**
PART I: NEED		
1.	Is the land use associated with the activity being applied for considered within the timeframe intended by the existing approved SDF agreed to be the relevant environmental authority?	Yes. The Municipalities regional services model and regional structures are an integral part of its rationale to bring services closer to the people and to transform regions into superb places to live, work and stay while capitalising on each regions' uniqueness to create strong, resilient and prosperous areas. The EMM adopted its Integrated Development Plan (IDP) in 2017/18 which maps out the delivery agenda of the current term of office of the City for the period 2017 to 2020/21.
2.	Should the development, or if applicable, expansion of the town/area concerned in terms of this land use occurs here at this point in time?	Yes, according to the Regional Developmental Overview for Region D (MSDF, 2015), the proposed project falls within an area which is prioritized for "Urban Farms", and the intention of development in this area is to create vibrant, equitable and sustainable rural development which provides food and work opportunities.
3.	Does the community/area need the activity and the associated land use concerned? This refers to the strategic as well as local level.	The poultry industry is the largest segment of the South African agricultural sector, contributing more than 16% of its share of gross domestic product. The gross value of primary agricultural production from poultry meat (inclusive of all types of poultry) for the period 2016 was R36.67 billion, reflecting an annual decrease of 5.5% (source: DAFF). Poultry meat contributed 30.5% to the gross value of animal products (down from 34.1% in 2015) and 14.1% to all agricultural production (down from 16.6%). The poultry from Ingwazi Trading is being sold to a 100% local market. Thus this provides the opportunity for higher competition, and consequently, lower prices

NEED AND DESIRABILITY OF THE PROPOSED PROJECT		
Questions (Notice 792, NEMA, 2012)		**Answer**
		of the products. This will benefit the local communities financially. On a strategic level, the increase in produce will have an effect on South Africa's poverty and food crisis, and this project will aid in the National priority of boosting local economic development to improve the standard of living for rural communities.
4.	Are the necessary services with adequate capacity currently available (at the time of application) or must additional capacity be created to cater for the development?	Yes. The proposed project will be using water directly for the registered borehole and will not rely on municipal water services. In addition, the site already has access to municipal electricity. The road networks are fully intact and the project will not have a major impact on road congestion. Thus, additional capacity does not need to be created for the development.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of the services and opportunity cost)?	The development is not provided for in the infrastructure planning of the municipality as it is a small development of local importance. Thus, the proposed project will not have any implications for the infrastructure planning, as no services and/or infrastructure needs to be upgraded or created to cater for this development. The current status of the infrastructure in the area will suffice for the proposed development.
6.	Is the project part of a national programme to address an issue of national concern or importance?	This project addresses the national challenge of food security in South Africa. The current food security challenge in South Africa consists of two dimensions: the first tries to maintain and increase South Africa's ability to meet its national food requirements, and the second seeks to eliminate inequalities and poverty amongst households that is made apparent by inadequate and unstable food production, lack of purchasing power, poor nutritional status and weak institutional support networks and disaster management systems. According to the most recent data from Statistics South Africa (Stats SA), approximately 14.3 million South Africans are vulnerable to food insecurity. In response, the Government of South Africa is implementing the Integrated Food Security Strategy (IFSS) of 2002. In addition, The National Development Plan (NDP) Vision for 2030 offers a long-term perspective. It defines a desired destination and identifies the role different sectors of society need to play in reaching that goal. The main goals highlighted in the NDP which pertain to the proposed project are employment and adequate nutrition. Chapter 6 of the National

NEED AND DESIRABILITY OF THE PROPOSED PROJECT		
Questions (Notice 792, NEMA, 2012)		**Answer**
		Development Plan highlights an "inclusive rural economy" and the objectives of this plan are to create jobs in agriculture, maintain a positive trade balance for primary and processed agricultural products and activating rural economies through service to small and micro farmers.
PART II: DESIRABILITY		
1.	Is the development the best practicable environmental option for this land/site?	Yes. This site does not have high crop agricultural potential according to the Gauteng Agricultural Potential Atlas (GAPA 4), which makes the site ideal for broiler production. The site is also located close to local markets and abattoirs and the area is characterized by very low-density dwellings. In addition, there is already an existing small-scale broiler facility on site, and the need for the expansion signifies the likely success of the enterprise on this site.
2.	Would the approval of this application compromise the integrity of the existing approved and credible IDP and SDF as agreed to by the relevant authorities?	No. The proposed project aligns itself with the EMM Vision outlined in the IDP. The following strategic objectives are sought to be achieved and are aligned with the objectives of the proposed project: Promote shared economic growth and job creation; Improve financial sustainability; Continue institutional development, transformation and innovation.
3.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	No, the integrity of the existing environmental management priorities for the area will not be compromised by this development. The EMM has been identified by the Environmental Management Framework for the whole of Gauteng (GPEMF) in 2014 as one of seven "hubs" for agricultural development. The following three indicators were used to decide on the hub-boundaries: o Land capability = high potential agricultural land; o High intensity of existing agriculture; and o Location and adjacency constraints. The objectives of implementing the Gauteng agricultural hubs were: Prioritise agriculture as the preferred land-use within a confined and pre-defined fixed-boundary area; Focused farm-support and allocation of government resources; Creating hubs of preferred agricultural commodities based on crop suitability and market requirements; and Fulfilling and meeting the requirements of the Gauteng Growth and Development Strategy.
4.	Do location factors favour this land use at this place? (this relates to the contextualization of the	Yes, as mentioned in Question 3 above, this area has been demarcated for agricultural development/ "urban

NEED AND DESIRABILITY OF THE PROPOSED PROJECT		
	Questions (Notice 792, NEMA, 2012)	**Answer**
	proposed land use on this site within its broader context).	farms" in the greater context of the province due to its location and adjacency to favourable markets, high land capability and high intensity of existing agriculture resulting in the services, technologies support and labour to be easily accessible in the area.
5.	How will the activity of the land use associated with the activity being applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	The development of the proposed development associated infrastructure measuring around 1 ha in size will exert an impact on the environment; but based on the findings of the Ecological Impact Assessment (Appendix G), and as per the ecologist recommendation and the locality of the site, the impacts associated with this proposed development can be mitigated to an acceptable level (Low) See Section E for a further explanation of the impacts of the proposed project on the environment.
6.	How will the development impact on people's health and well-being? (E.g. In terms of noise, odours, visual character and sense of place, etc.)?	See Section E of this Report with regards to the Impact Assessment. In summary, due to the fact that this area has an extremely low density of residents and dwellings and the site is zoned for agriculture (meaning the majority of the visual and sense of place aesthetics in the area are correlated to agricultural activities), the impacts on well-being, following mitigation, will be as follows: Visual: Low Odours: Medium Noise: Low Sense of place: Low
7.	Will the proposed activity or the land use associated with the activity being applied for, result in unacceptable opportunity costs?	No. The poultry industry provides employment, directly and indirectly, for about 108 000 people throughout its value chain and related industries. It supports many businesses and provides a strong platform for rural development, as well as the government's zero-hunger goals, as it is the main supplier of a protein diet.
8.	Will the proposed land use result in unacceptable cumulative impacts?	No. The proposed project has only been identified to have limited cumulative impacts that can be mitigated to an acceptable level. The measures outlined in the EMPr attached will serve as a method to keep the proposed project from having any serious ling term cumulative impacts on the receiving environment. Please see Section E4 for a description of the potential cumulative impacts.

E.10 The period for which the environmental authorisation is required

(consider when the activity is expected to be concluded)

The Environmental Authorisation is required for a minimum of 20 years.

E.11 Environmental Management Programme (EMPr)

(must include post construction monitoring requirements and when these will be concluded.)

If the EAP answers "Yes" to Point 7 above then an EMP is to be attached to this report as an Appendix

EMPr attached	**Yes – Appendix H.**

Draft Basic Assessment Report –
Proposed Ingwazi Trading (Pty) Ltd
Chicken Broiler Facility, 74 Dahlia Road,
Welgedacht A.H. Springs, Gauteng

SECTION F: APPENDICES

SECTION F: APPENDICES

The following appendices are attached to this BA Report:

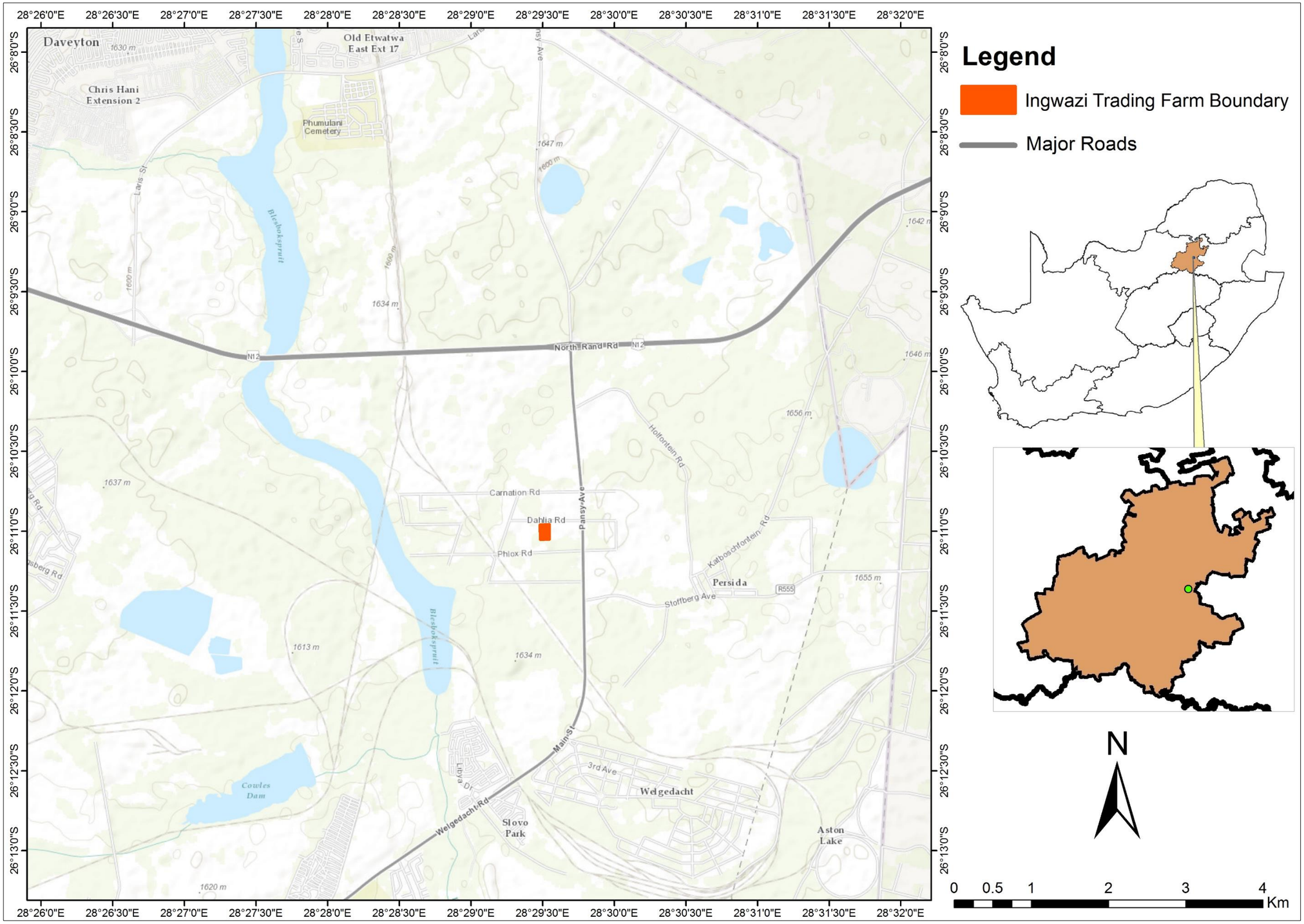
APPENDIX A:	Site plan(s) – (must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)
APPENDIX B:	Photographs
APPENDIX C:	Facility illustration(s)
APPENDIX D:	Route position information – **NOT APPLICABLE**
APPENDIX E:	Public Participation information
APPENDIX F:	SAHRA information, service letters from municipalities, water supply information – **NOT APPLICABLE**
APPENDIX G:	Ecological Specialist report
APPENDIX H:	EMPr
APPENDIX I:	Other information • I-1: CV's of the project team (EAPs who prepared the report) • I-2: EAP declaration

BASIC ASSESSMENT REPORT

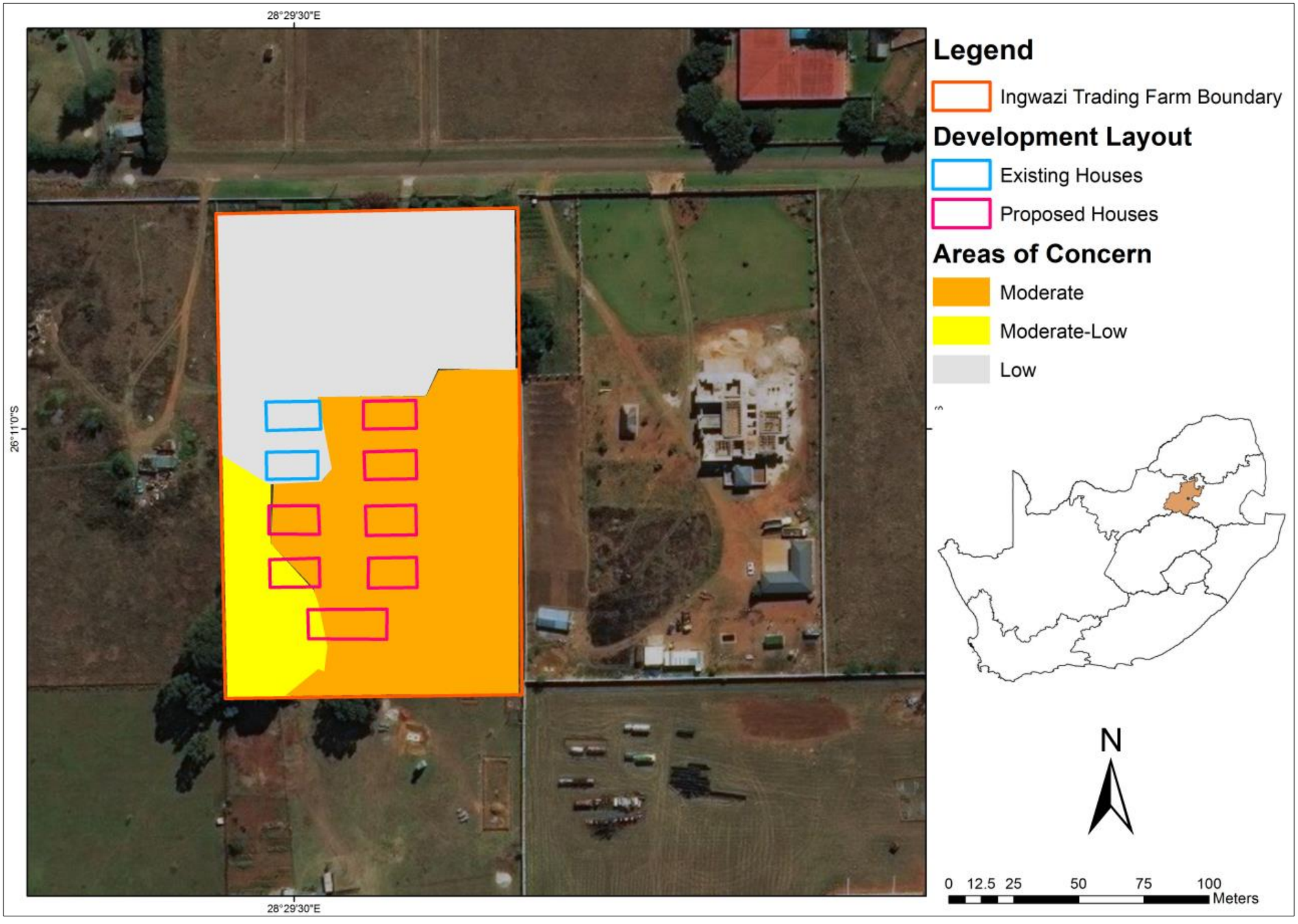
Appendix A: Site Layout Plans

CONTENTS

Map A.1: Site and locality map of the proposed project



Map A.2: Map indicating environmental sensitivities overlain with the site layout of the proposed facility on site



BASIC ASSESSMENT REPORT

Appendix B: Photographs

CONTENTS

Figure B.1: Site photographs in the 8 compass directions from the centre of the site

BASIC ASSESSMENT REPORT

Appendix C: Facility illustration(s)

CONTENTS

Figure C.1: Facility layout of the proposed project

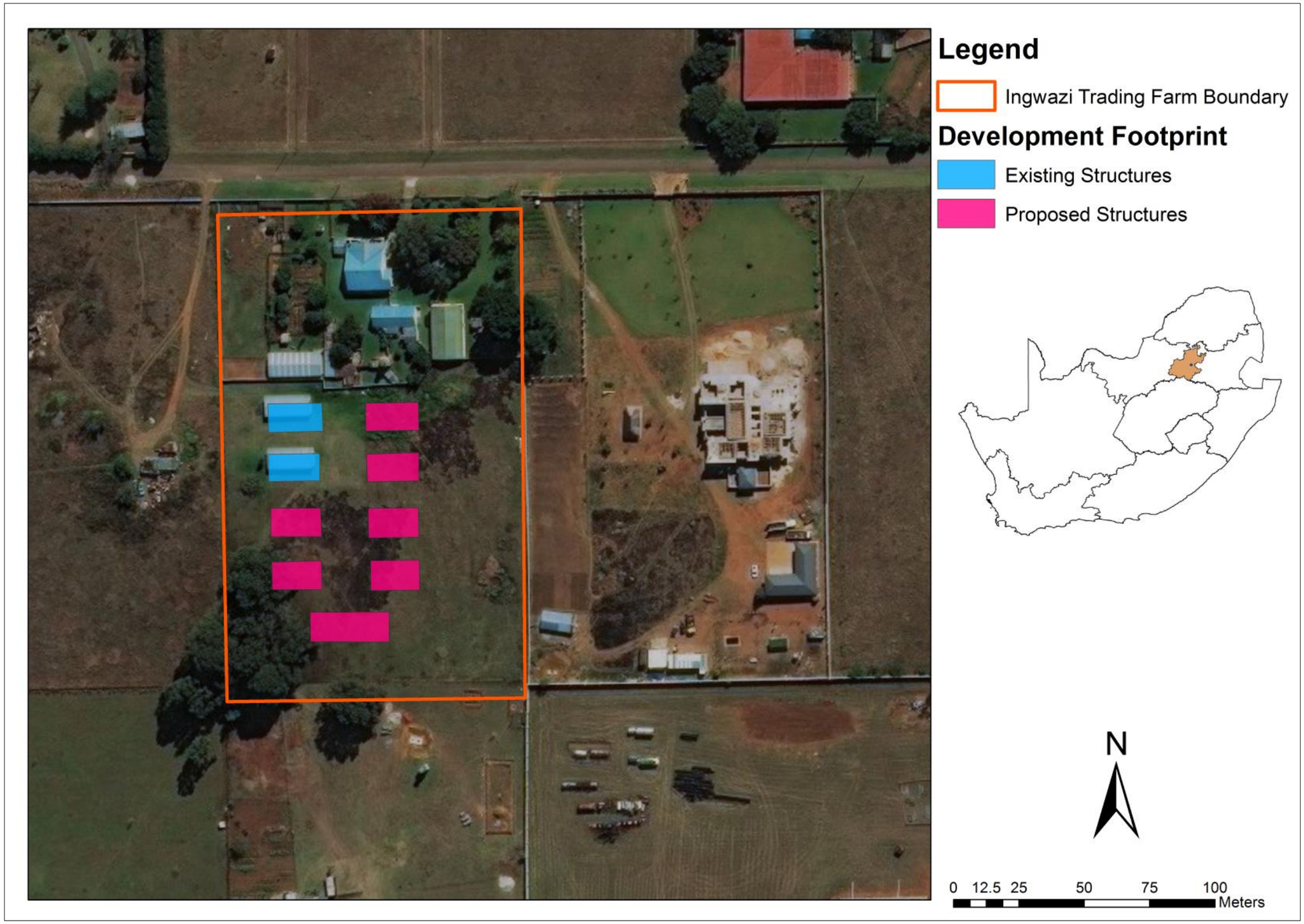
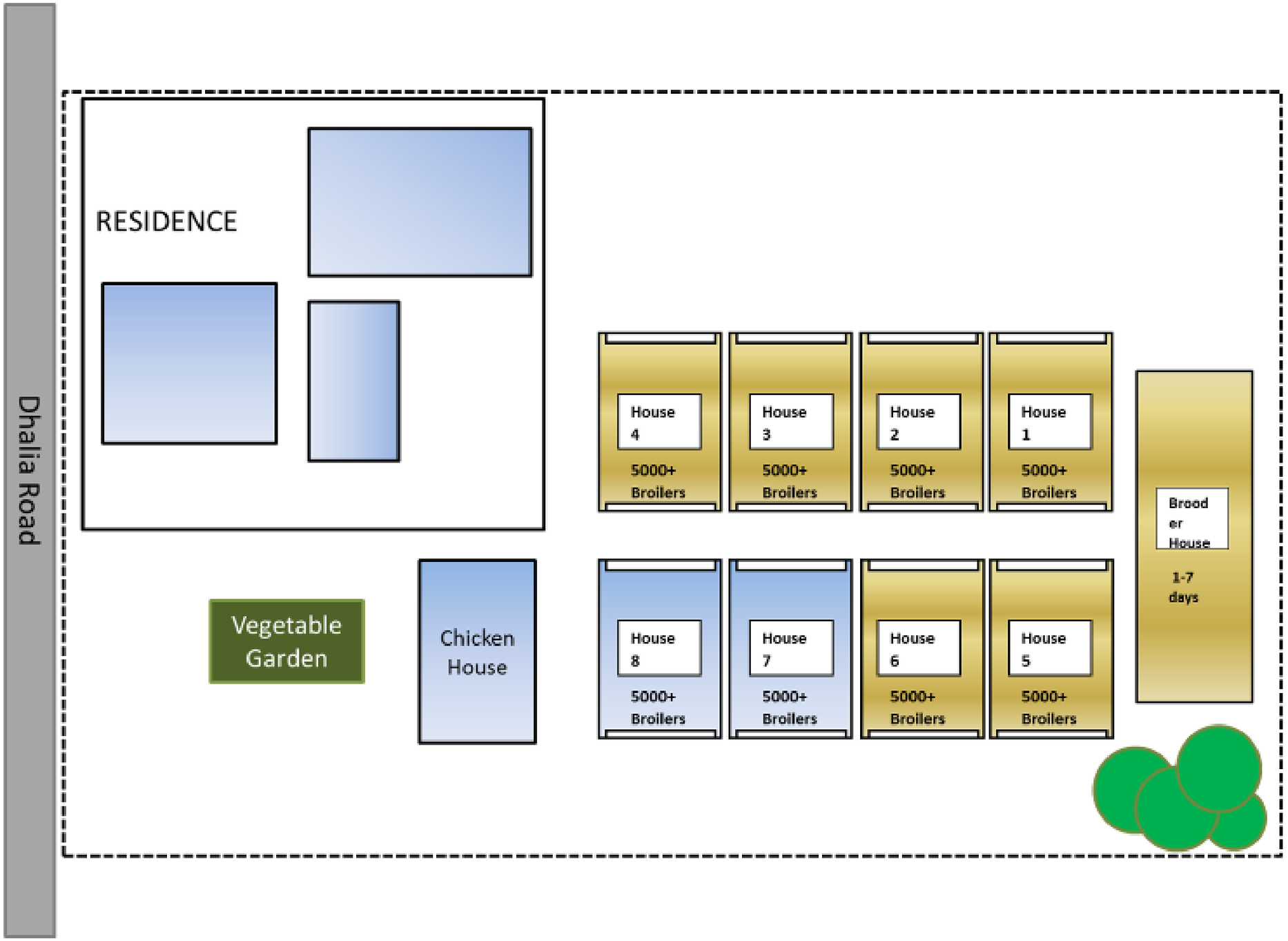


Figure C.2: Facility illustration of the proposed project



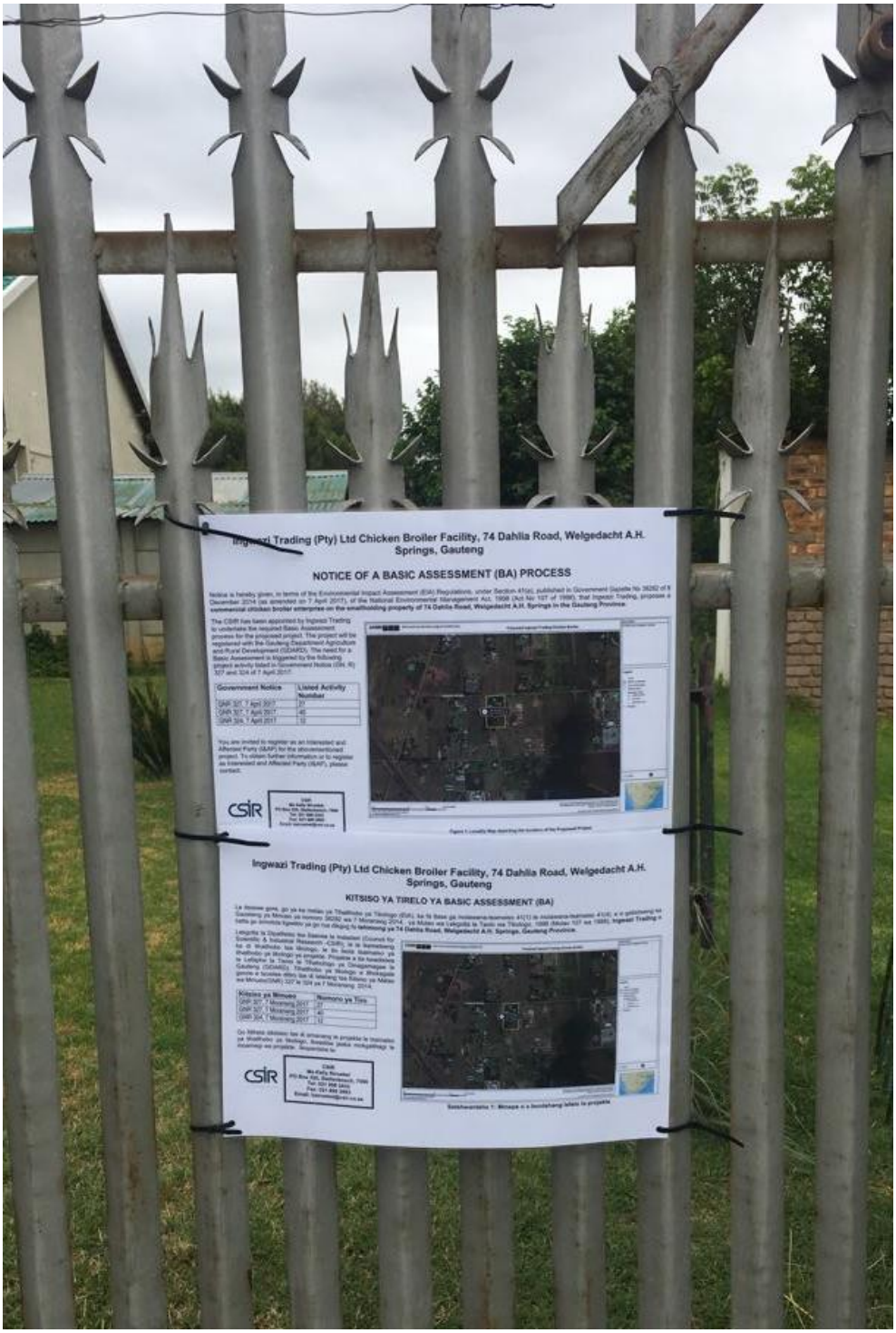
BASIC ASSESSMENT REPORT

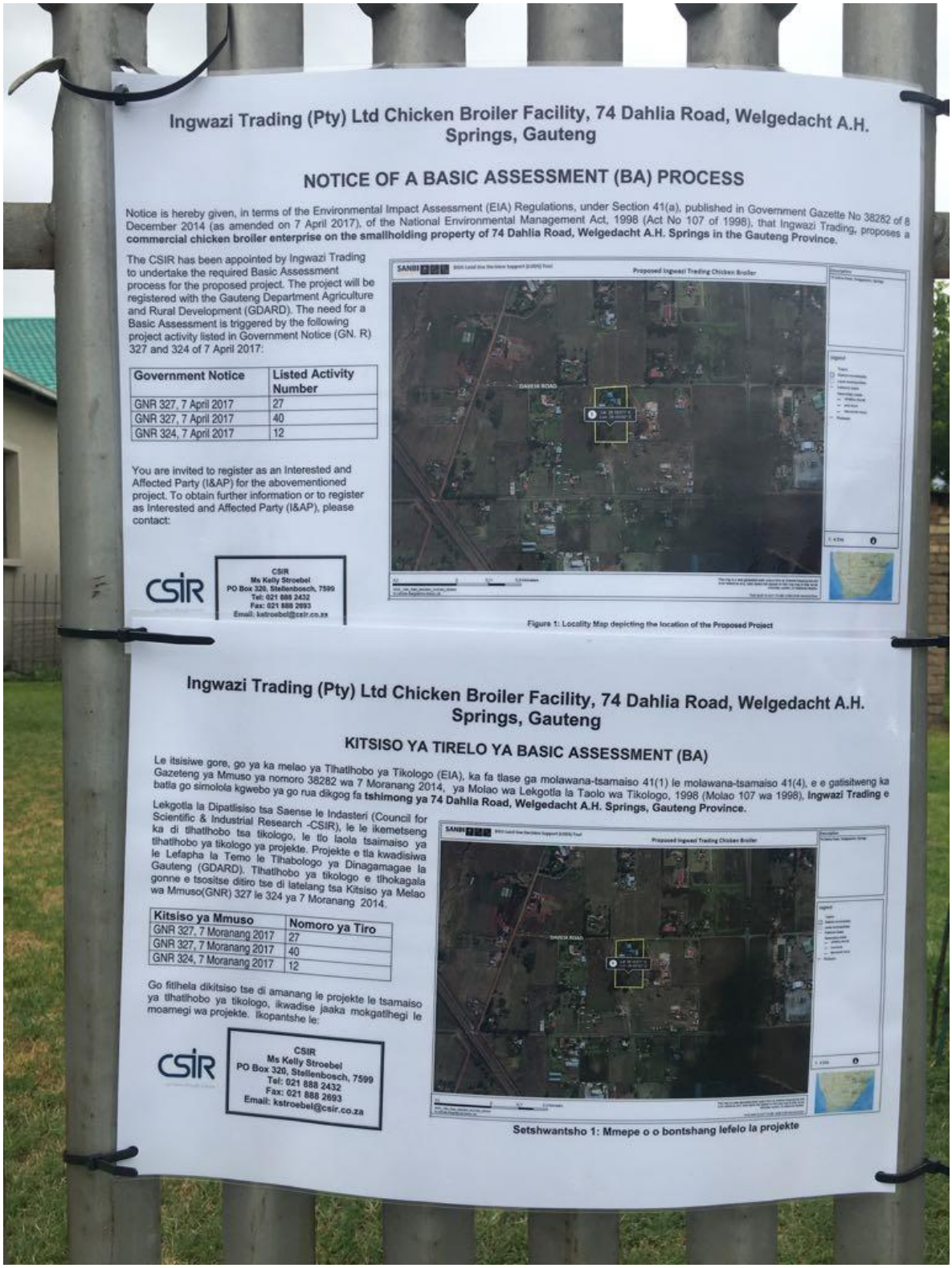
Appendix E: Public participation information

CONTENTS

Appendix E1: Proof of site notice

Site notices (English and Tswana) placed at the gate to the proposed site
(GPS co-ordinates: 26°10'57"S, 28°29'30'E)





Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

NOTICE OF A BASIC ASSESSMENT (BA) PROCESS

Notice is hereby given, in terms of the Environmental Impact Assessment (EIA) Regulations, under Section 41(a), published in Government Gazette No 38282 of 8 December 2014 (as amended on 7 April 2017), of the National Environmental Management Act, 1998 (Act No 107 of 1998), that Ingwazi Trading, proposes a **commercial chicken broiler enterprise on the smallholding property of 74 Dahlia Road, Welgedacht A.H. Springs in the Gauteng Province.**

The CSIR has been appointed by Ingwazi Trading to undertake the required Basic Assessment process for the proposed project. The project will be registered with the Gauteng Department Agriculture and Rural Development (GDARD). The need for a Basic Assessment is triggered by the following project activity listed in Government Notice (GN. R) 327 and 324 of 7 April 2017:

Government Notice	Listed Activity Number
GNR 327, 7 April 2017	27
GNR 327, 7 April 2017	40
GNR 324, 7 April 2017	12

You are invited to register as an Interested and Affected Party (I&AP) for the abovementioned project. To obtain further information or to register as Interested and Affected Party (I&AP), please contact:

CSIR
Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstroebel@csir.co.za

Figure 1: Locality Map depicting the location of the Proposed Project

Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

KITSISO YA TIRELO YA BASIC ASSESSMENT (BA)

Le itsisiwe gore, go ya ka melao ya Tlhatlhobo ya Tikologo (EIA), ka fa tlase ga molawana-tsamaiso 41(1) le molawana-tsamaiso 41(4), e e gatisitweng ka Gazeteng ya Mmuso ya nomoro 38282 wa 7 Moranang 2014, ya Molao wa Lekgotla la Taolo wa Tikologo, 1998 (Molao 107 wa 1998), **Ingwazi Trading** e batla go simolola kgwebo ya go rua dikgog fa **tshimong ya 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng Province.**

Lekgotla la Dipatlisiso tsa Saense le Indasteri (Council for Scientific & Industrial Research -CSIR), le le ikemetseng ka di tlhatlhobo tsa tikologo, le tlo laola tsaimaiso ya tlhatlhobo ya tikologo ya projekte. Projekte e tla kwadisiwa le Lefapha la Temo le Tlhabologo ya Dinagamagae la Gauteng (GDARD). Tlhatlhobo ya tikologo e tlhokagala gonne e tsositse ditiro tse di latelang tsa Kitsiso ya Melao wa Mmuso(GNR) 327 le 324 ya 7 Moranang 2014.

Kitsiso ya Mmuso	Nomoro ya Tiro
GNR 327, 7 Moranang 2017	27
GNR 327, 7 Moranang 2017	40
GNR 324, 7 Moranang 2017	12

Go fitlhela dikitsiso tse di amanang le projekte le tsamaiso ya tlhatlhobo ya tikologo, ikwadise jaaka mokgatlhegi le moamegi wa projekte. Ikopantshe le:

CSIR
Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstroebel@csir.co.za

Setshwantsho 1: Mmepe o o bontshang lefelo la projekte

Contents of the site notices (English) placed at the gate to the proposed site

Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

NOTICE OF A BASIC ASSESSMENT (BA) PROCESS

Notice is hereby given, in terms of the Environmental Impact Assessment (EIA) Regulations, under Section 41(a), published in Government Gazette No 38282 of 8 December 2014 (as amended on 7 April 2017), of the National Environmental Management Act, 1998 (Act No 107 of 1998), that Ingwazi Trading, proposes a **commercial chicken broiler enterprise on the smallholding property of 74 Dahlia Road, Welgedacht A.H. Springs in the Gauteng Province.**

The CSIR has been appointed by Ingwazi Trading to undertake the required Basic Assessment process for the proposed project. The project will be registered with the Gauteng Department Agriculture and Rural Development (GDARD). The need for a Basic Assessment is triggered by the following project activity listed in Government Notice (GN. R) 327 and 324 of 7 April 2017:

Government Notice	Listed Activity Number
GNR 327, 7 April 2017	27
GNR 327, 7 April 2017	40
GNR 324, 7 April 2017	12

You are invited to register as an Interested and Affected Party (I&AP) for the abovementioned project. To obtain further information or to register as Interested and Affected Party (I&AP), please contact:

CSIR
Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstroebel@csir.co.za

Figure 1: Locality Map depicting the location of the Proposed Project

Contents of the site notices (Setswana) placed at the gate to the proposed site

Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng

KITSISO YA TIRELO YA BASIC ASSESSMENT (BA)

Le itsisiwe gore, go ya ka melao ya Tlhatlhobo ya Tikologo (EIA), ka fa tlase ga molawana-tsamaiso 41(1) le molawana-tsamaiso 41(4), e e gatisitweng ka Gazeteng ya Mmuso ya nomoro 38282 wa 7 Moranang 2014, ya Molao wa Lekgotla la Taolo wa Tikologo, 1998 (Molao 107 wa 1998), **Ingwazi Trading** e batla go simolola kgwebo ya go rua dikgog fa **tshimong ya 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng Province.**

Lekgotla la Dipatlisiso tsa Saense le Indasteri (Council for Scientific & Industrial Research -CSIR), le le ikemetseng ka di tlhatlhobo tsa tikologo, le tlo laola tsaimaiso ya tlhatlhobo ya tikologo ya projekte. Projekte e tla kwadisiwa le Lefapha la Temo le Tlhabologo ya Dinagamagae la Gauteng (GDARD). Tlhatlhobo ya tikologo e tlhokagala gonne e tsositse ditiro tse di latelang tsa Kitsiso ya Melao wa Mmuso(GNR) 327 le 324 ya 7 Moranang 2014.

Kitsiso ya Mmuso	Nomoro ya Tiro
GNR 327, 7 Moranang 2017	27
GNR 327, 7 Moranang 2017	40
GNR 324, 7 Moranang 2017	12

Go fitlhela dikitsiso tse di amanang le projekte le tsamaiso ya tlhatlhobo ya tikologo, ikwadise jaaka mokgatlhegi le moamegi wa projekte. Ikopantshe le:

CSIR
Ms Kelly Stroebel
PO Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
Email: kstroebel@csir.co.za

Setshwantsho 1: Mmepe o o bontshang lefelo la projekte

Appendix E2: Copy of the register of I&APs

Organisation/ Department	Name
NATIONAL	
Department of Environmental Affairs-National	Mmatlala Rabothata
	Sibusisiwe Hlela
	Takalani Nemarude
Department of Rural Development and Land Reform	Dr Nozizwe Makgalemele
Department of Rural Development and Land Reform	Christopher Nyangintsimbi
Department of Rural Development and Land Reform	Bonginkosi Zulu
Department of Agriculture, Forestry and Fisheries	NRM
Department of Agriculture, Forestry and Fisheries	Mashudu Marubini
Department of Agriculture, Forestry and Fisheries	Ms Thoko Buthelezi
National Department of Water Affairs	Ms Ndileka K mohapi
	Namisha Muthraparsad
PROVINCIAL/MUNICIPAL	
Department of Agriculture and Rural Development	Steven Mukhola
Department of Agriculture and Rural Development	Karabo Mohatla
Department of Agriculture and Rural Development	Phuti Matlamela
Department of Health	Albert Marumo
Department of Water and Sanitation	Ms M Musekene
	Ms T Rakgotho
Gauteng Department of Infrastructure Development	Bethuel Netshiswinzhe
Gauteng Department of Social Development	Shoki Tshabalala
Gauteng Department of Economic Development	Phindile Mbanjwa
Gauteng Dep of Health	Shantal Perry
Gauteng Dep of Health	Dineo Mathopa
GDARD waste management	Zingisa Smale
Ehurhuleni Metropolitan Municipality: Ward Councillors	DEAN DESMOND STONE
Ehurhuleni Metropolitan Municipality: Ward Councillor	Samson Shabangu

Organisation/ Department	Name
Ehurhuleni Metropolitan Municipality: Ward Councillor	RAMESHLAL SHEODIN
Ehurhuleni Metropolitan Municipality	Sibiya Stephan
Ehurhuleni Metropolitan Municipality	Ms le Roux Shauné
Ehurhuleni Metropolitan Municipality	Mr Hendricks Johan
Ehurhuleni Metropolitan Municipality	Mr Green Stewart
Ehurhuleni Metropolitan Municipality	Ms Rakgoale Cecilia
OTHER	
South African National Parks (SANParks)	Dr Howard Hendriks
South African Heritage Resources Agency (SAHRA)	Marie South
Endangered Wildlife Trust (EWT)	Stephanie Aken
AgriLand	Anneliza Collett
Grasslands Society of South Africa	Feyni Du Toit
WESSA	Tumi Lehabe
EWT	Adam Pires
EWT	Dr Harriet Davies
The Provincial Heritage Resources Authority Gauteng	Maphata Ramphele
Birdlife	Simon Gear
Eskom- servitudes development	Lungile Motsisi
Client and Landowner	Fazila Kahn

IMPORTANT NOTES ON PUBLIC PARTICIPATION:

The following documentation will only be included in the Final BA Report to be submitted to the Competent Authority for decision making **(they are not available at this stage of the process to be included in this version of the report, as they are being released at the same time as this report).**

- Written notices issued as required in terms of the regulations and communications to interested and affected parties
- Proof of placement of newspaper advertisements
- Communications from interested and affected parties
- Comments and Responses Report

Draft Basic Assessment Report –
Proposed Ingwazi Trading (Pty) Ltd
Chicken Broiler Facility, 74 Dahlia Road,
Welgedacht A.H. Springs, Gauteng

Appendix G:
Specialist Reports
(including Terms of Reference)

Basic Assessment of the Proposed Expansion of a Chicken Broiler Facility on Smallholding 74 Dahlia Road, Welgedacht A.H.,Springs, Gauteng

ECOLOGICAL SPECIALIST STUDY

March 2018

Prepared for:
Ingwazi Trading (Pty) Ltd.

Prepared by:
CSIR
P O Box 320, Stellenbosch, 7599
Tel: +27 21 888 2482
Fax: +27 21 888 2473
Email: RMarivate@csir.co.za

Authors:
Rirhandzu Marivate, Minnelise Levendal and Paul Lochner

Reviewers:
Susan Abell (Natural Scientific Services CC), Lydia Cape (CSIR)

EXECUTIVE SUMMARY

The Council for Scientific and Industrial Research (CSIR) conducted a terrestrial ecology study for the proposed expansion of a small-scale chicken broiler facility for Ingwazi Trading (Pty)Ltd, on a smallholding in Springs, Gauteng Province. The smallholding of approximately 1.7 hectares is zoned for agriculture. There is an existing chicken farm on the site housing approximately 3000 chickens that has been in operation for approximately 10 years. Ingwazi propose to expand their facilityon the small holding by 5000 chickens. The expansion will consist of constructing new chicken houses with a total footprint of approximately 2000 m^2 (i.e. 0.2 hectares).

A desktop research and field investigation conducted in November 2017 indicated that most of the site has been subject to previous and current human and agricultural activities, such as livestock grazing, dumping, grass being mowed and thus is considered a transformed grassland. The transformed grassland falls under the Soweto Highveld Grassland vegetation, and still contains some indigenous grasses and herbaceous plants including, *Eragrostis curvula, Cynodon dactylon and Sporobolus* species. Additionally, there is a section of alien invasive vegetation in the south western section of the property considered to be Category 1 under the National Environmental Management: Biodiversity Act (Act 10 of 2004)[1]. These comprise Bluegum trees (*Eucalyptus camaldulensis)* and Prickly pear (*Opuntia ficus-indica*) and therefore would be required to be cleared.

In terms of fauna species, given the transformed nature of the small holding and that the greater area is residential and agricultural smallholdings, a number of potentially occurring Conservation Important faunal species were rated as being least likely to occur on site.

The table below gives a summary of the potential impacts of the proposed project on the ecology and biodiversity of the site, with and without mitigation measures.

Summary of impact significance, without and with mitigation:

[1]Alien and Invasive Species Regulations published in the Government Gazette No. 37886, 1 August 2014.

Potential Impacts	Significance	
	Without mitigation	**With mitigation**
Construction		
1) Loss of terrestrial vegetation and faunal habitat	*Medium*	*Low*
2) Increase in occurrence and spread of alien plant species	*Low*	*Low*
3) Increased dust and erosion from construction activities	*Medium*	*Low*
4) Sensory disturbance on fauna flora from construction activities	*Low*	*Low*
Operation		
5) Sensory disturbance on fauna flora from noise, lights and dust from chicken facility	*Medium*	*Low*
6) Contamination of environment from poor waste and chemical management	*Medium*	*Low*
7) Increase in prevalence of pest from poor hygiene and chicken waste management	*Medium*	*Low*
8) Increase of diseases from poor chicken waste management and prevalence of pests on native fauna	*Medium*	*Low*
Decommissioning		
9) Decommissioning and removal of buildings on the flora and fauna on site	*Medium*	*Low*

If the developer continues with the development, they will be required to remove the Category 1b alien invasive species onsite as per the Alien and Invasive Species Regulations (2014). The development of the chicken broiler facility with the implementation of the mitigation measures recommended in this report, is predicted to result in an ecological impact of low significance. Based on the site visit and the information that was available to date, it is the opinion of the CSIR that there are no fatal flaws to the project from an ecological perspective. If the recommended mitigation measures are implemented, the specialist has no objection to the project going forward.

DECLARATION

I, Rirhandzu Marivate, in my capacity as a specialist consultant, hereby declare that I-

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Have and will not have vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- 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 in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- 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;
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member;
- Based on information provided to me by the project proponent and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional ability; and
- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field.

Rirhandzu Marivate
SACNASP Reg. No. 100147/14
Cand. Sci. Nat. (Environmental Science) **Date 01 March 2018**

Specialist Expertise

RIRHANDZU MARIVATE
Cand. Sci. Nat. Environmental Science

Specialisation: Environmental Assessment and Management; Landscape and Ethno- Ecology.

Rirhandzu commenced work at the CSIR in January 2014. Rirhandzu holds a Bachelor degree in Zoology & Geology, Honours in Ecology, Environment and Conservation from the University of the Witwatersrand; and has environmental research experience with the University of Cape Town focused on stakeholder engagement on provisioning of freshwater resources. Rirhandzu is currently studying towards her Master in Philosophy in Sustainable Development at the University of Stellenbosch.

Her current work at the CSIR involves the Special Needs and Skills Development (SNSD) Programme, which looks at assisting Community Trusts, Small, Micro to Medium Enterprises, with various environmental management services.

QUALIFICATIONS

2017 - current	MPhil Sustainable Development	University of Stellenbosch, Western Cape
2010	BSc. Hons. Ecology, Environment and Conservation	University of the Witwatersrand, Gauteng
2009	BSc. Zoology, Geology	University of the Witwatersrand, Gauteng

PROJECT TRACK RECORD

Completion Date	Project description	Role	Client
2014 (in progress)	**Special Needs and Skills Development Programme:** Programme management and conducting of Basic Assessments for disadvantaged communities/businesses/enterprises	**Project Manager;** Stakeholder Co-ordination; Project Support; Mentorship; Ecological Input	National Department of Environmental Affairs (DEA), South Africa
2013- 2014	**Monitoring and Evaluation** for the National Strategy for Sustainable Development and Action Plan.	**Project Member;** Stakeholder engagement, Researcher, Report Writing	National Department of Environmental Affairs (DEA), South Africa
2013-2015	Update of the National Department of Environmental Affairs' database for Environmental Impact Assessment application for wind energy and solar PV energy projects	Review and update of the database	National Department of Environmental Affairs (DEA), South Africa

Completion Date	Project description	Role	Client
2014-2016	**Strategic Environmental Assessment (SEA)** for Electricity Grid Infrastructure (EGI).	Liaising with KwaZulu-Natal stakeholders, organising meetings, and coalating comments and concerns.	National Department of Environmental Affairs (DEA), South Africa
2014	**Screening Study (SS)** for the Development of Biochar and Composting Facilities to support land restoration near the proposed Ntambelanga Dam, Umzimvubu Catchment, Eastern Cape**.**	**Project Manager,** Project Research & Report Writing	National Department of Environmental Affairs (DEA), South Africa
2015	**Environmental Screening Study (ESS)** for projects undertaken in the Amatikulu Aquaculture Development Zone, KwaZulu-Natal.	**Project Manager,** Project Research & Report Writing	National Department of Agriculture, Forestry & Fisheries (DAFF), S Africa
2015-2016	**Development of Sustainability Indicators** for the National Integrated State of the Environment Report for Namibia.	**Project Manager**, Project Research & Report Writing	Ministry of Environment and Tourism (MET), Namibia
2016	**Basic Assessment** for the development of a 5.5 hectares (ha) pig production facility and a 2.5 ha chicken broiler facility on Farm Rietvalei, Portion 1 & 6, near Delmas, Mpumalanga.	**Project Manager**	Mokate Estates (Pty) Ltd
2016	**Basic Assessment** for the development of a 0.6 ha Chicken Layer Facility on a 7.8 ha farm in Mashau-Bodwe Village, Makhado District, Limpopo.	**Project Manager**	Wanga Poultry (Pty) Ltd
2016	**Sustainable Development Appraisal for Gold Standard** on a microprogramme of the NOVA Brickstar Wood Stove in the Mahlaba Area, Limpopo.	**Project Member**, Project Researcher, Translator	Gold Standard Foundation
2017	**Sustainable Development Goal Lab** on "Mainstreaming resilience into climate change adaptation and disaster risk planning."	**Project Member**	Future Earth; Stockholm Resilience Centre; University of Tokyo
In progress	**Basic Assessment** for the proposed development of a leisure and cultural village on Farm Moiloa 412-JO, Dinokana Village, North West.	**Project Manager**	Makadima Leisure & Cultural Village 101 (Pty) Ltd
In progress	**Basic Assessment** forthe expansion of a Chicken Layer Facility on a 4.4 hectare farm on	**Project Manager**	Lewin AgriBusiness (Pty) Ltd

Completion Date	Project description	Role	Client
	plot 226 Withok Estate, Brakpan, Ekurhuleni District, Gauteng		
In progress	**Basic Assessment** for the expansion of a Chicken Broiler Facility on a 2.57 hectare farm on plot 62, Mapleton, Ekurhuleni District, Gauteng.	**Project Manager**	Mthunzi Chicken Supplier (Pty) Ltd
In progress	**GEF funded biodiversity and land use project**	**Technical/specialist support and mentoring**	South African Biodiversity Institute (SANBI)

COMPLIANCE WITH THE APPENDIX 6 OF THE 2017 EIA REGULATIONS

Requirements of Appendix 6 – GN R326 Einvironmental Impact Assessment (EIA)Regulations 7 April 2017	**Addressed in the Specialist Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 6; Appendix 5
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 5
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 2
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3
e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 3
f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 5
g) an identification of any areas to be avoided, including buffers;	Section 6.4
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 23
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the	Section 7

	environment;	
k)	any mitigation measures for inclusion in the EMPr;	Section 7
l)	any conditions for inclusion in the environmental authorisation;	Section 7
m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 7
n)	a reasoned opinion- i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 8
o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 4
p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q)	any other information requested by the competent authority.	N/A

FIGURES

Appendix 1 Plant species recorded in QDS 2628 AB

Appendix 2 List of all recorded mammals species in QDS 2628AB. Data source: MammalMAP, 2018

Appendix 3 List of all recorded butterfly species in QDS 2628AB

Appendix 4Bird species that have been recorded in pendat 2610_2825 (SABAP2 2018)

Appendix 5 Approach and terminology used for the impact assessment

Appendix 6 Letter of confirmation of External Review

Appendix 7 Curriculum Vitae of Rirhandzu Marivate

Alien vegetation	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome - usually international in origin.
Biome	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.
Critical Biodiversity Area	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Ecological Support Area	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Important Bird and Biodiversity Area	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous Vegetation	Vegetation occurring naturally within a defined area.
Red Data List species	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Species of Conservation Concern	All RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed species as well as protected species of relevance to the project.
Critically endangered species (CN):	Any indigenous species facing an extremely high risk of extinction in the wild in the immediate future
Endangered species (EN)	Any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a CN species.
Vulnerable species (VU)	Any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a CN species or an EN species
Protected species (PT)	Any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

1. INTRODUCTION

The Council for Scientific and Industrial Research (CSIR) has been appointed by the National Department of Environmental Affairs (DEA) to manage the Special Needs and Skills Development Programme. This programme provides *pro-bono* environmental services to community trusts and emerging entrepreneurs with "special needs", i.e. they are from disadvantaged backgrounds without access to financial and other resources that enable them to meet the requirements of the National Environmental Management Act (NEMA), which can then prevent them from implementing projects to support their livelihoods. The programme undertakes Basic Assessments for projects that require this assistance in applying for Environmental Authorisation. This led to the CSIR undertaking this Basic Assessment for Ingwazi Trading as the applicant qualifies as a special needs applicant and can therefore be assisted under this programme.

This Ecological Assessment was prepared by Ms Rirhandzu Marivate of the CSIR, Cand. Sci. Nat, to inform the Basic Assessment for the expansion of a chicken layer facility that is located on a 1.7 hectares (ha) small holding at 74 Dahlia Road, Welgedacht, A.H. Springs, Gauteng ((26°10'59.06"S, 28°29'30.78"E) (Figure 1). The study investigates the potential impacts on the ecology and biodiversity of the proposed development.

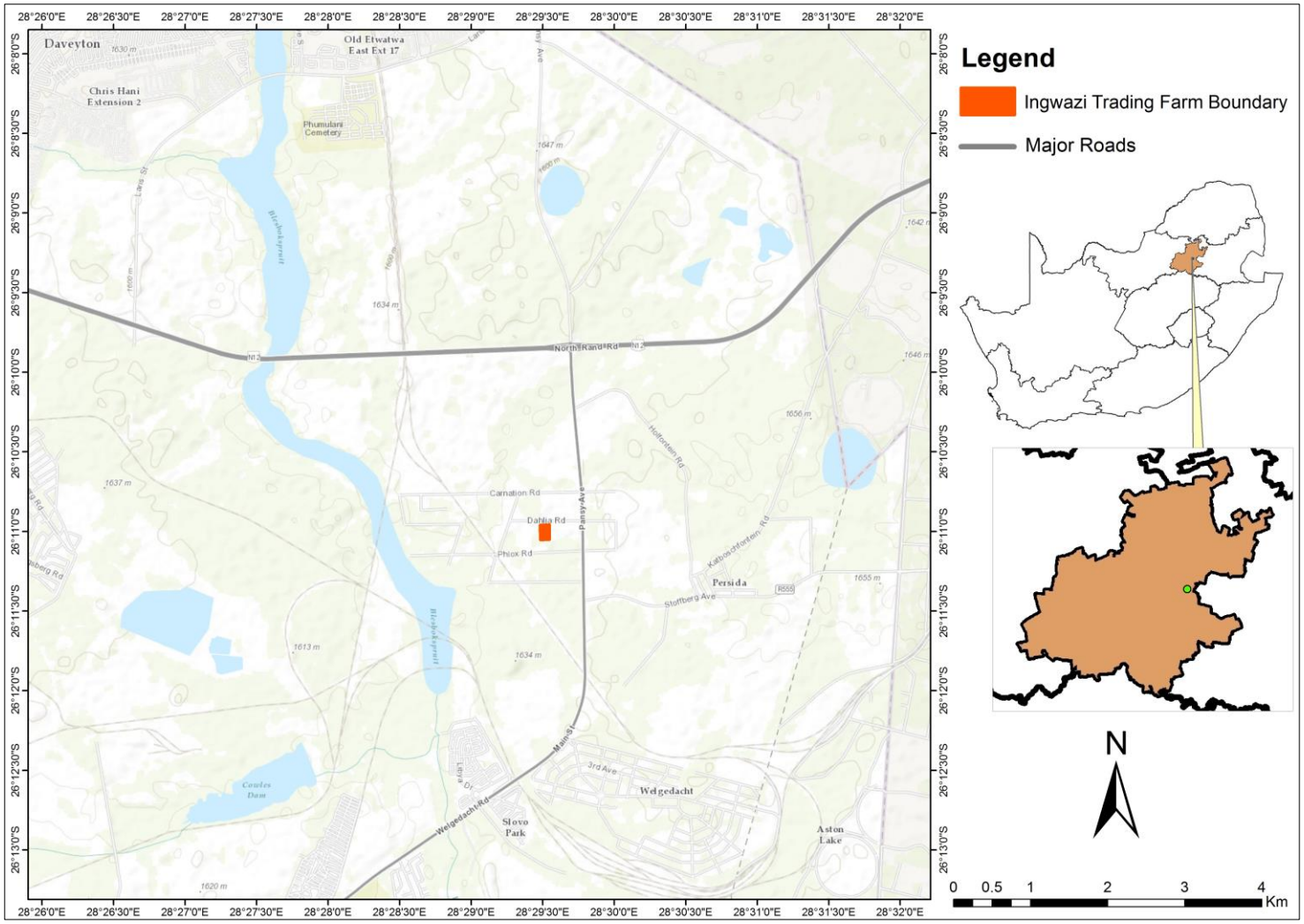


Figure 1: Location of the Ingwazi Trading small scale commercial farming enterprise near Springs, Ekurhuleni Municipality, Gauteng Province. Source: Chief Surveyor General topographical map coverage at scale of 1: 40 000.

Ingwazi Trading (Pty) Ltd (hereafter, Ingwazi Trading), is a small scale commercial farming enterprise registered at 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng. The property falls on an urban edge and is currently zoned for agricultural use (Ekurhuleni MSDF, 2015). The smallholding is approximately 1.7 ha. There is currently a chicken broiler facility on site housing approximately 3 000 chickens, and Ingwazi Trading proposes to expand their facility to 40 000 chickens (5 000 chickens per house x 8 houses). Of these, eight new chicken houses, two already exist and are empty, and one brooder house exists on site. The expansion will consist of constructing six new chicken houses and one new brooder house, with a total footprint of approximately 2000 m^2 (i.e. 0.2 ha) on this small holding, owned by Ingwazi Trading.

Currently, the existing chicken facility has a footprint of 0.25 ha and consists of the following infrastructure as illustrated in Figure 2:

- Farm house;
- 3 x chicken houses (2 are empty);
- Warehouse;
- 2 x boreholes;
- Storeroom;
- Vegetable garden;
- Small numbers of livestock; and
- Water tower and tank.

Ingwazi proposes to construct the following additional facilities with a total footprint of 800 m^2:

- 6 x chicken houses (each with a footprint of 8.5 x 30 m); and
- 1 x brooder house (with a footprint of 3.8m x 3m).

The focus of this study is to assess the ecological impact of the additional 2000 m^2 development on the site. The layout of the proposed development is provided in Figure 2& 3.

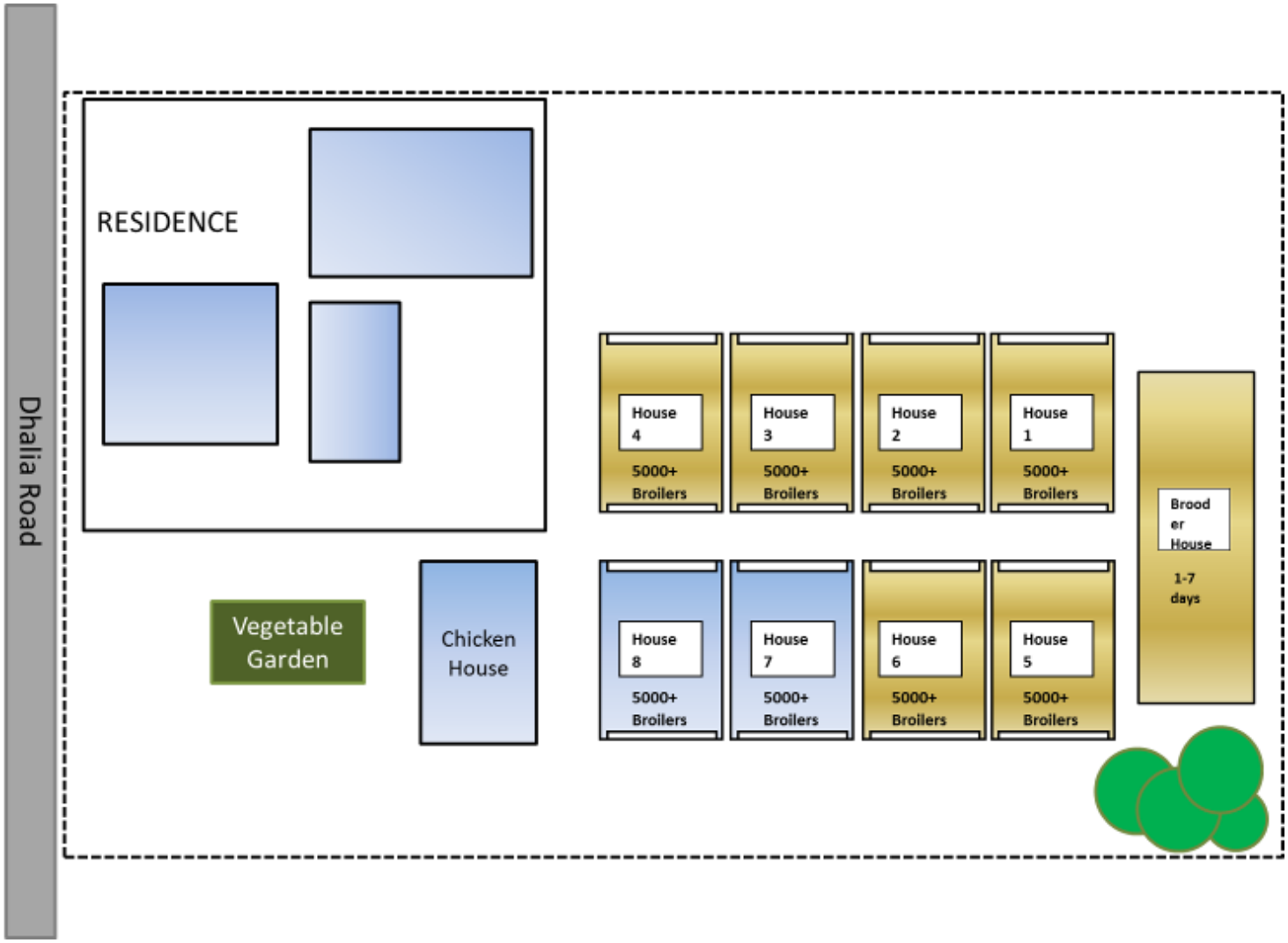


Figure 2: Layout of existing facilities (shaded in blue) and proposed expansion of chicken houses 1 to 6 and brooder house (shaded in yellow).Source: Ingwazi Trading (Pty) Ltd & CSIR, 2018.

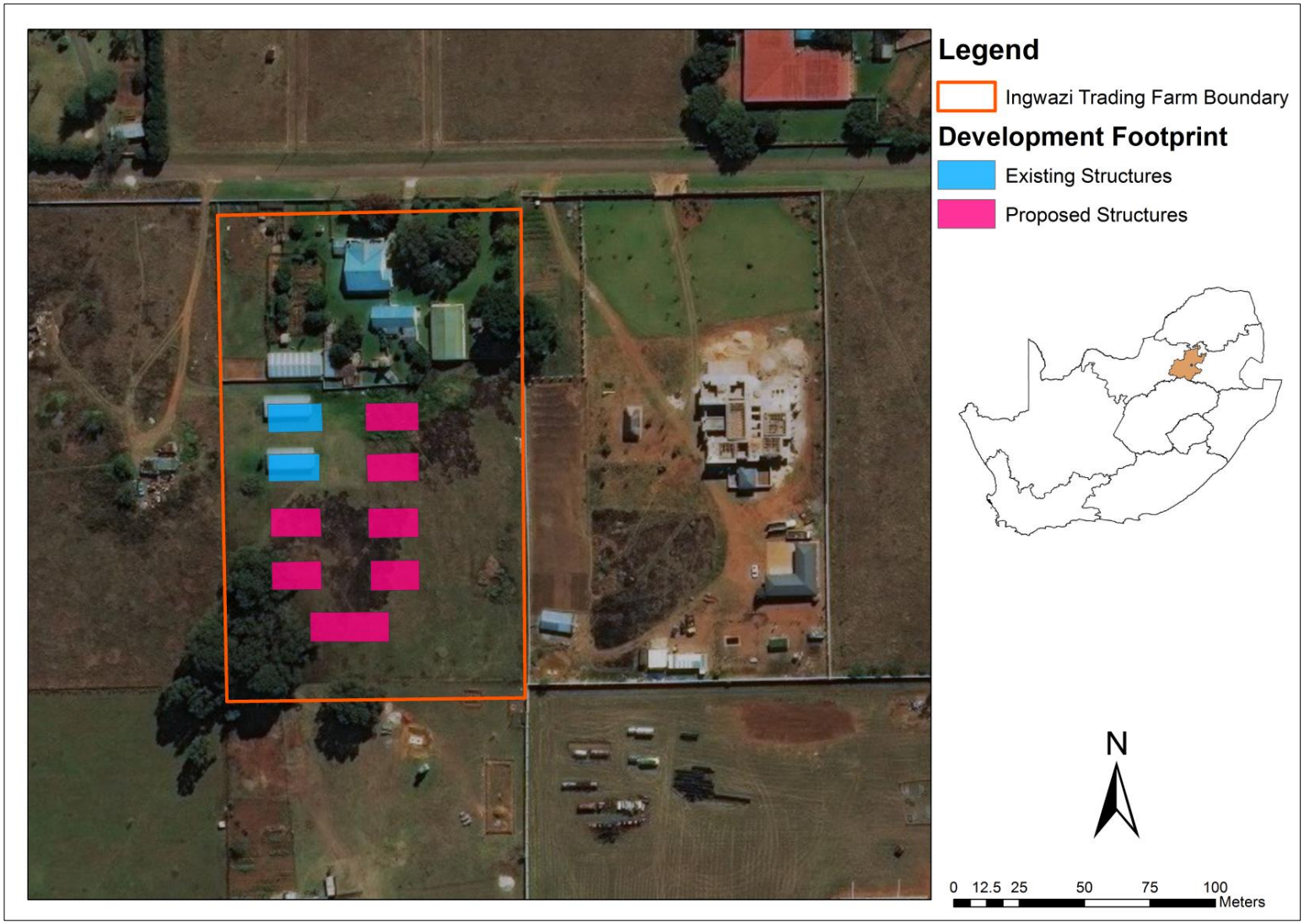


Figure 3: Layout of proposed expasion of chicken egg layer facility. Source: Google Earth Imagery, 2018.

2. SCOPE OF THIS ECOLOGICAL STUDY

The objective of the study is to identify the potential impacts of the proposed expansion of the chicken layer facility on the ecology and biodiversity of the proposed site and surrounding habitat. The study investigated terrestrial flora and fauna features, which may be impacted by the proposed project as well as habitat diversity and quality on the study site using available datasets such as Red Data Species lists and Critical Biodiversity Areas. A site visit was then undertaken to verify the results of the environmental screening desktop analysis and collect primary data on the species present on the site.

The specific outcomes in terms of this ecology specialist report are:

- Determine the status and composition of faunal and floral species on the proposed site;
- Identify any threatened species and species of conservation concern occurring on the study site;
- Identify sensitive landscapes including rocky ridges, wetlands, and any other ecologically important features, if present;
- Identify and assess all potential environmental impacts that the proposed development may have on the study site, especially species of conservation concern; and
- Develop mitigation measures and management actions to be implemented in order to prevent or remediate these impacts.

3. METHODOLOGY

This ecological assessment was conducted in two phases:

1. A preliminary desktop study was done using publicly available datasets and satellite imagery of Google Earth. This preliminary screening aimed at defining a baseline of the proposed site (biome, vegetation type, species of special conservation status), identifying any potential fatal flaws and determine the key features to ground-truth during the site visit. The following databases were consulted during the desktop study:
    - South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP, 2017);
    - Gauteng Conservation Plan Version 3.3 (C-Plan, 2011);
    - Mucina and Rutherford (2006);
    - National Biodiversity Assessment (NBA, 2011);
    - Animal Demographic Unit, Virtual Museum (ADU, 2018), including online species distribution data within QDS 2628AB from:
        - MammalMAP (2018).
        - ReptileMAP (2018).
        - FrogMAP (2018).
        - LepiMap (2018) for butterflies.

    - OdonataMAP (2018) for dragonflies and damselflies.
    - ScorpionMAP(2018).
- Birdlife South Africa datasets and guidelines
- Extract for the pentad 2610_2825 of the South African Bird Atlas Project (SABAP2, 2018)
- Most recent Red data List (International Union for Conservation of Nature, 2017) and Pretoria National Herbarium Computer Information Systems (PRECIS, 2009);

2. A site visit was then undertaken in accordance with GDARD Biodiversity Study Guidelines (2014) on the 30 November 2017, aiming at verifying the desktop study results. Several Vegetation sampling points were performed on site as illustrated in Figure 4.

Please refer to Appendix 4 of this report for the methodologies relating to the impact assessment and development of mitigation measures.

Figure 4: Vegetation sampling points from survey conducted on 30 November 2017.Source: Google Earth Imagery, 2018

4. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are applicable to this study:

- The ecological assessment was conducted within the boundaries of the proposed project area, and excluded the neighbouring and adjacent properties; these were, however, considered as part of the desktop assessment;
- Most of the floral and faunal communities have been considered and assessed accurately, however, some aspects may have been unknowingly overlooked because of the dynamic nature of ecosystems;
- The increased level of surrounding anthropogenic activities and the nature and behaviour of most faunal taxa may have affected the number of species that were observed during the site visit. The site observations were also supplemented by information obtained from the literature/desktop study where necessary;
- The data presented in this report are based on a single site visit, undertaken in summer on 30 November 2017 by Rirhandzu Marivate and Babalwa Mqokeli of the CSIR;
- A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was supplemented with all available desktop data;
- No formal consultation process was undertaken, apart from consulting with the project development/ land owner as well as the process undertaken as part of the formal Basic Assessment process (CSIR, 2018); and
- Due to the limited time spent on site and the date of the site visit, the absence of species on site does not mean that the species is not present at the site. Another site visit at a different time of the year e.g. during or following the summer rains could lead to the identification of other faunal and floral species and result in additional observations for the site.

5. DESKTOP ASSESSMENT FINDINGS

5.1 Baseline of the proposed site

- **Climate**

The study site is situated in a summer rainfall region with a mean annual rainfall of approximately 450 to 550 mm (World Weather Online, 2018). As illustrated in Figure 5, about 80% of the annual rainfall occurs from October to April. As illustrated in Figure 6, the average midday temperatures range from 15°C in June to 26°C in January (World Weather Online, 2018). During winter, the temperature drops to 0.2°C on average during the night. Winters are dry with frequent frost that occurs from mid-April to September. Summers are mild with temperatures that are seldom above 30°C (Mucina & Rutherford, 2006).

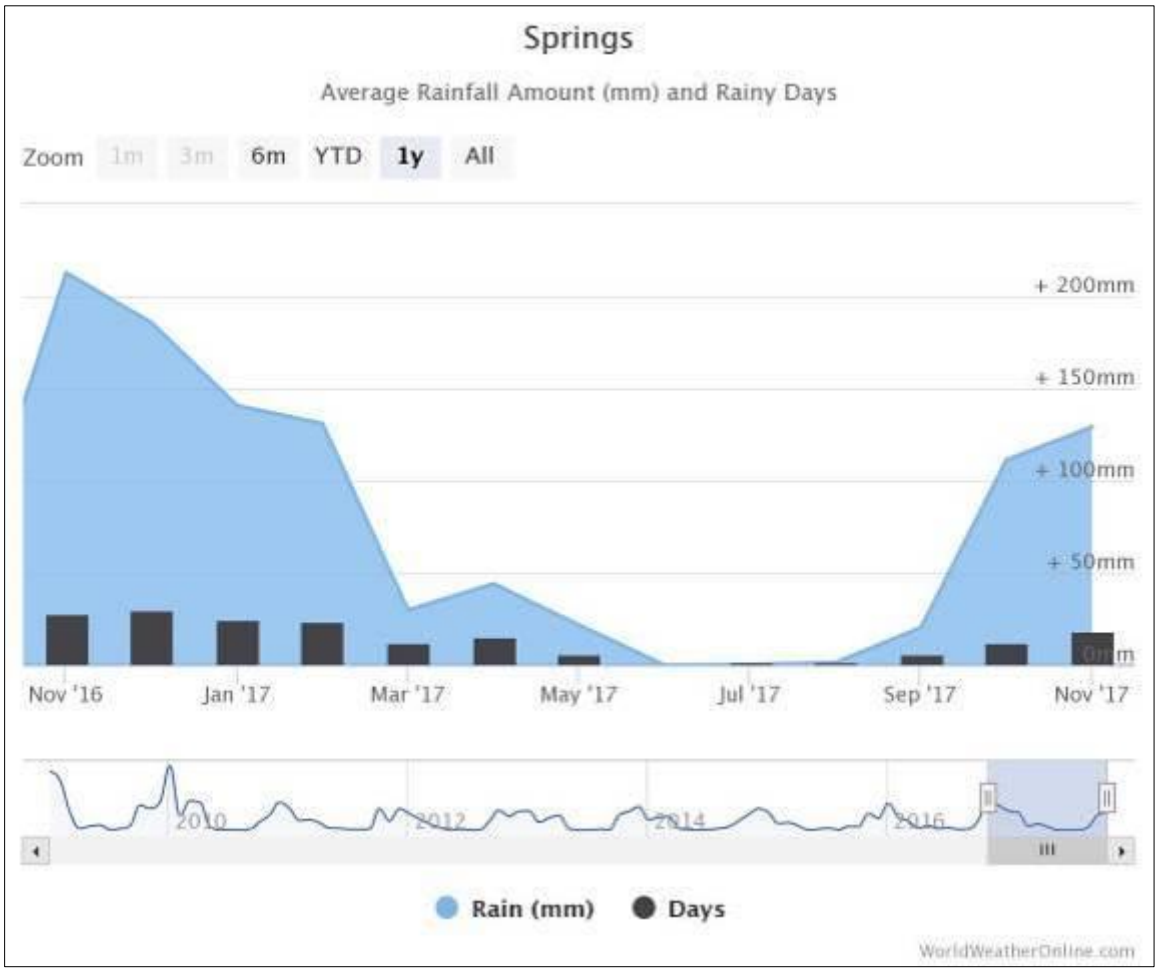


Figure 5: Average rainfall in mm. Source: World Weather Online, 2018.

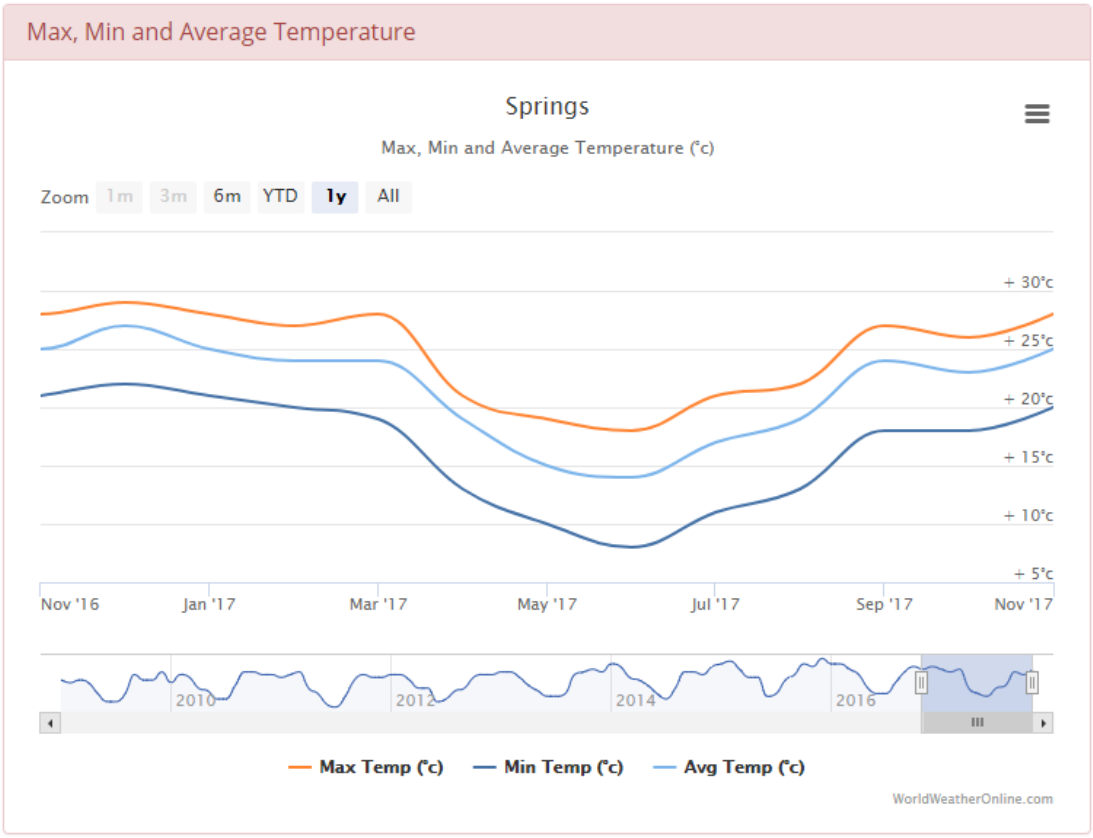


Figure 6: Average temperature in degree celcius. Source: World Weather Online, 2018.

- **Soils and Topography**

Based on the Simplified geology database of South Africa compiled by the Council for Geosciences, the Geology of the region is dominated by shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites (Figure 7). In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant (Council for Geosciences, 2008).The region in which the project area occurs is generally flat with a few outstanding topographic features, including a superimposed river valley (Blesbokspruit) on plains with pans. The soils in the region are deep and can be described as red, yellow and or greyish soils with low to medium base status (Mucina & Rutherford, 2006).

- **Vegetation**

Ingwazi Trading is situated in the Grassland Biome of Southern Africa, which is defined by summer rainfall combined with dry winters and frost, with marked diurnal temperature variations, and are unfavourable to tree growth. Grasslands mainly comprise of grasses and plants with perennial underground storage organs, such as bulbs and tubers, but less trees. The Grassland Biome consists of various different vegetation types. The site more specifically falls within the Soweto Highveld Grassland (Mucina & Rutherford, 2006), as identified in the most recent vegetation map (SANBI,

2012), (Figure 8). The distribution of the grassland includes Mpumalanga, Gauteng and to a smaller extent, the Free State and North West Provinces. The landscape is gentle to moderately undulating on the Highveld plateau that supports short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix* (Mucina & Rutherford, 2006).

The Soweto Highveld Grassland is considered Vulnerable under Gazetted Threatened Ecosystems with the national government target aiming to protect at least 24%. Only a handful of patches are statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site) (Mucina & Rutherford, 2006). Almost half of the area is already transformed by cultivation, urban sprawl, mining and road infrastructure, with some areas having already flooded by dams (Grootdraai, Leeukuil, Trichardtsfontein, Vaal, Willem Brummer) (Mucina & Rutherford, 2006).

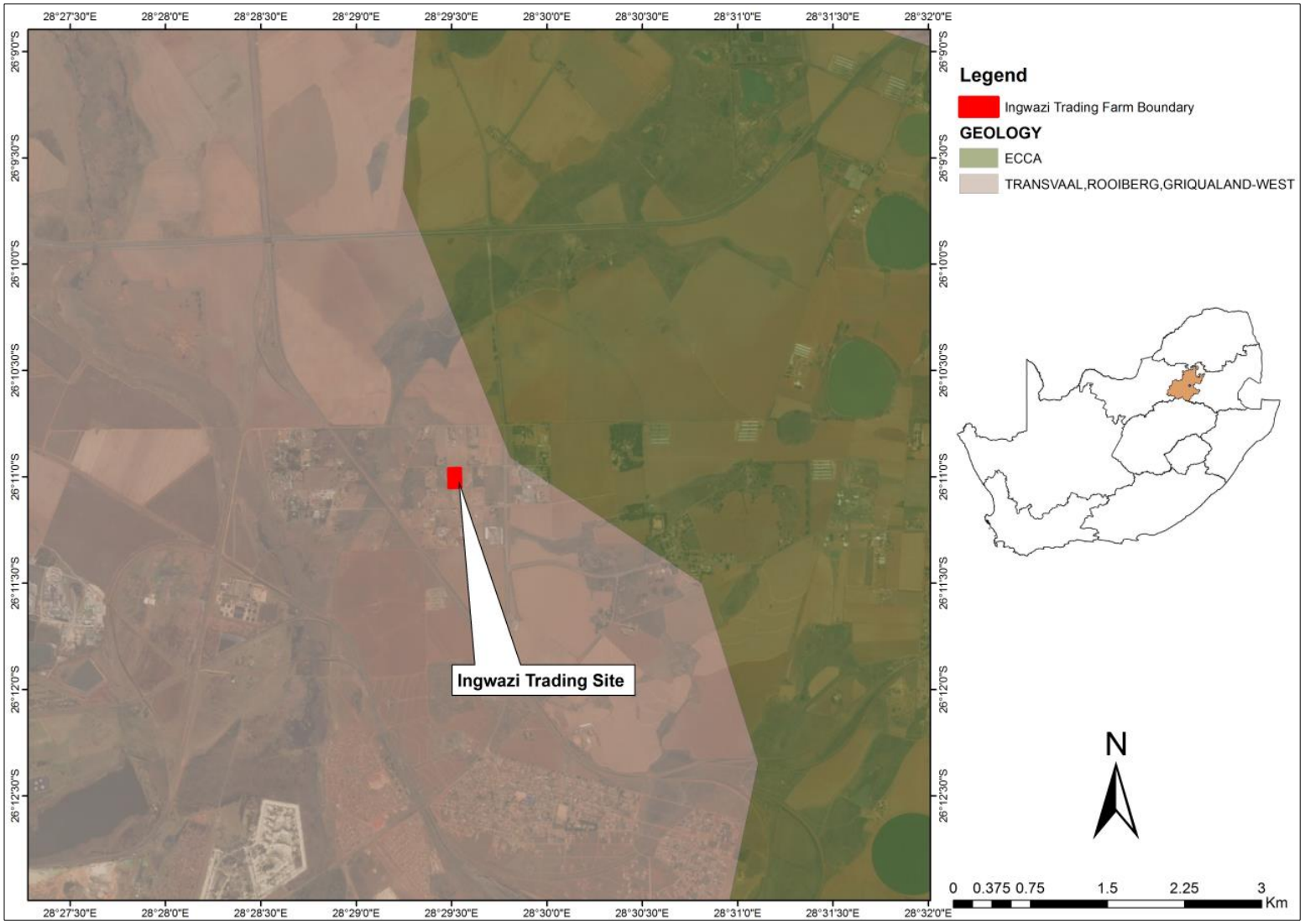


Figure 7: Underlying geology of the site. Data source:Council of Geosciences, 2008.

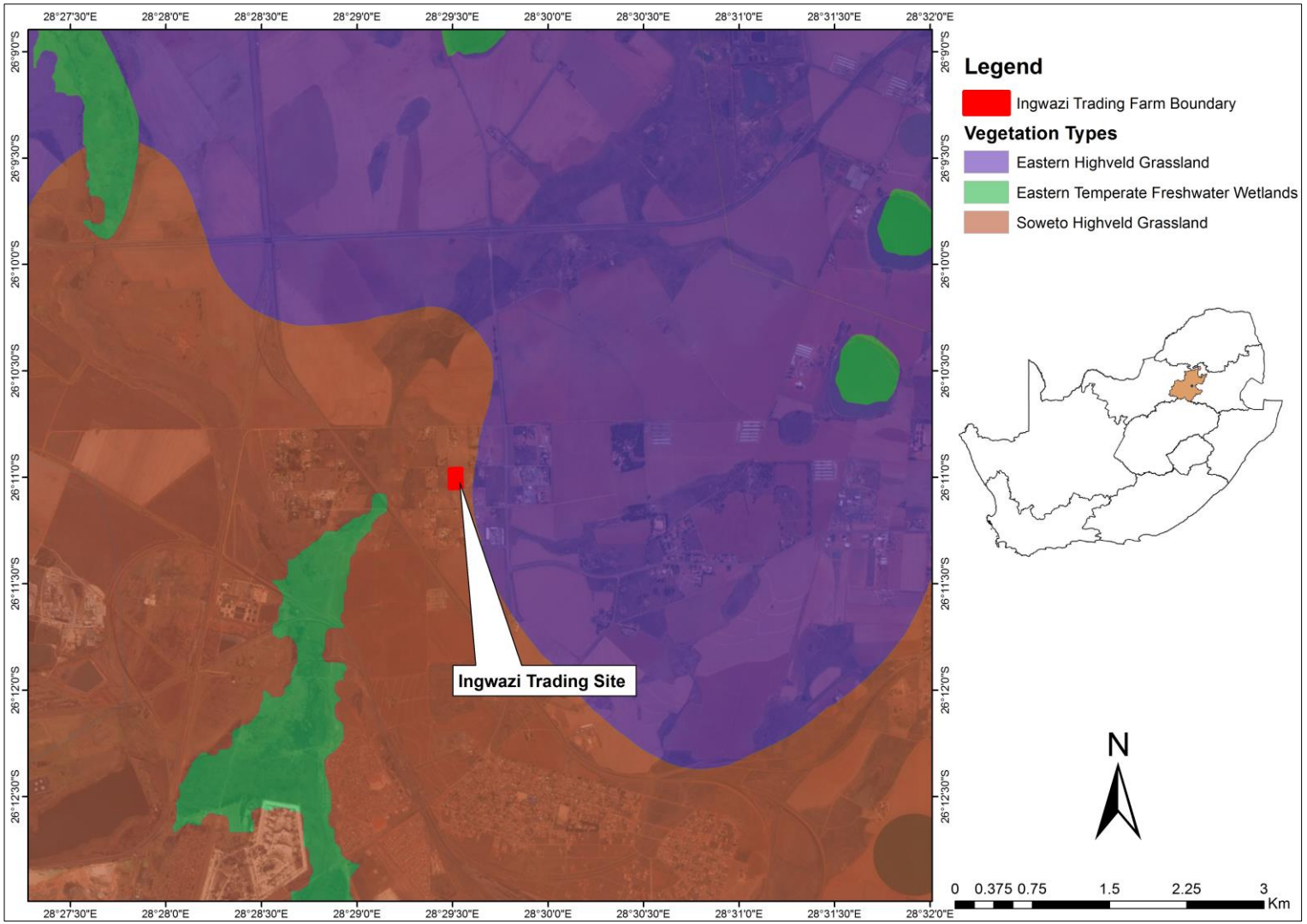


Figure 8: Regional vegetation type wherein the development site is situated.Data source:SANBI, 2012; Mucina & Rutherford, 2006.

5.2 Literature review

- **Applicable Legislation**

The following legislative requirements were considered during the assessment:

- National Environmental Management Act (Act 107 of 1998) (NEMA)
- National Environmental Management: Biodiversity Act (Act No.10 of 2004) (NEMBA) Regulations (Government Gazette 37885)
- Amended Regulations (Regulation 15) of the Conservation of Agricultural Resources Act (, Act 43 of 1983) (CARA).

The following documentation was also considered:

- GDARD Requirements for Biodiversity Assessments Version 3 (GDARD, 2014)
- Gauteng Conservation Plan Version 3.3 (C-Plan 3.3) (GDARD, 2011)
- Ekurhuleni Metropolitan Spatial Development Framework (Ekurhuleni MSDF, 2015)

- **International Areas**

- *Ramsar Site.* The Blesbokspruit Ramsar Site is situated approximately 5 km south of the proposed development site (Ramsar, 1995).
- *World Heritage Site.*There are no declared World Heritage Sites in the region where Ingwazi development site is situated.
- *Important Bird Area (IBA).* Ingwazi development situated approximately 5 km north of the Blesbokspruit IBA. The distance is within the flight path of many of the conservation important bird species that are present within this IBA (BirdLife, 2015).

The site does not fall into any proclaimed areas of international status.

- **Listed Terrestrial Priority Areas & Threatened Ecosystems**

NEMBA provides for the listing of Threatened or Protected ecosystems. These ecosystems are grouped into Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Protected Ecosystems in accordance with the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011). The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. The project falls within the Blesbokspruit Highveld Grassland (which includes the Soweto Highveld Grassland vegetation unit) that is listed as a Critically Endangered ecosystem as the remaining natural habitat is less than 85% of its original extent (Figure 9). Any remaining natural vegetation is thus considered to be of high conservation importance, with only 1% currently being protected (SANBI &DEAT, 2009).

The key features of the Blesbokspruit Highveld Grassland include (SANBI & DEAT, 2009):

- Red and Orange listed plants, such as *Delosperma leendertziae* and *Khadia besswicki*;
- Red or Orange Listed mammals such as the Spotted-necked Otter and Brown Hyena;
- Red or Orange Listed Birds such as the African Grass-Owl, Greater flamingo, Lesser Flamingo, African Marsh-Harriers, Secretary bird, Yellow-billed Stork, Caspian Tern, Melodious Lark, Lesser Kestrel, White-bellied Korhaan, and Corncrake.
- Red or Orange Listed or priority invertebrates for example the Heidelberg Copper Butterfly, and the Golden Starburst Baboon Spider, and
- Seven vegetation types including Andesite Mountain Bushveld, Eastern Highveld Grassland, Eastern Temperate Freshwater Wetlands, Gold Reef Mountain Bushveld, Rand Highveld Grassland, Soweto Highveld Grassland and Tsakane Clay Grassland.
- Rivers, wetlands and pans in the ecosystem include the Blesbokspruit, Klein-Blesbokspruit, Verdrietlaagte, Karringmelkpan, Riet Pan, Spaarwater Pan, University Pan, Varkfontein Pan, and various other unnamed wetlands and pans.

- **Freshwater Ecosystem Priority Areas**

The Blesbokspruit wetland was identified as Freshwater Ecosystem Priority Area (FEPA) in terms of the National Freshwater Ecosystem Priority Areas project (NFEPA; Driver *et al*., 2011), and as such represent a key feature of the ecosystem for water conservation. The Blesbokspruit wetland is located approximately 5 km south from the proposed site as illustrated in Figure 10.

- **Gauteng Conservation Plan**

The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011), classifies areas within the province on the basis of its contribution to reach the conservation targets within the province. Areas of conservation importance are classified as Critical Biodiversity Areas (CBAs) that should be conserved and Ecological Support Areas (ESAs) that are important for the maintenance of ecosystem function. CBAs are either “irreplaceable’ must be conserved) or “important” to reach the conservation targets and were classified based on the presence of primary vegetation as well as threatened plant and faunal species (GDARD, 2017). Ecological Support Areas (ESAs) were set aside to ensure sustainability in the long term. ESAs can include buffered wetlands, open natural semi-natural vegetation and even cultivated areas. ESAs provide vital connections between areas of high or critical biodiversity importance and are therefore not necessarily good condition or primary vegetation. In addition, areas formally protected are also indicated.

Based on the Gauteng Conservation Plan, the study site does not fall within any Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) (see Figure 11).

- **Species of conservation concern**

Chapter 4, Part 2 of NEMBA, Threatened or Protected Species (TOPS) Regulations provides for listing of flora and fauna species as Threatened or Protected, if any species is listed as Threatened, it must be further classified as Critically Endangered, Endangered, Vulnerable. These species are commonly referred to as TOPS listed. The status of the species for mammals, birds, reptiles, frogs, butterflies and scorpions as listed in TOPS are provided for the above mentioned fauna within QDS 2628AB and listed within their respective sections.

Furthermore, the global Red Data list status of faunal species that fall within QDS 2628AB as determined by IUCN are provided in the respective sections, indicated in the relevant sections.

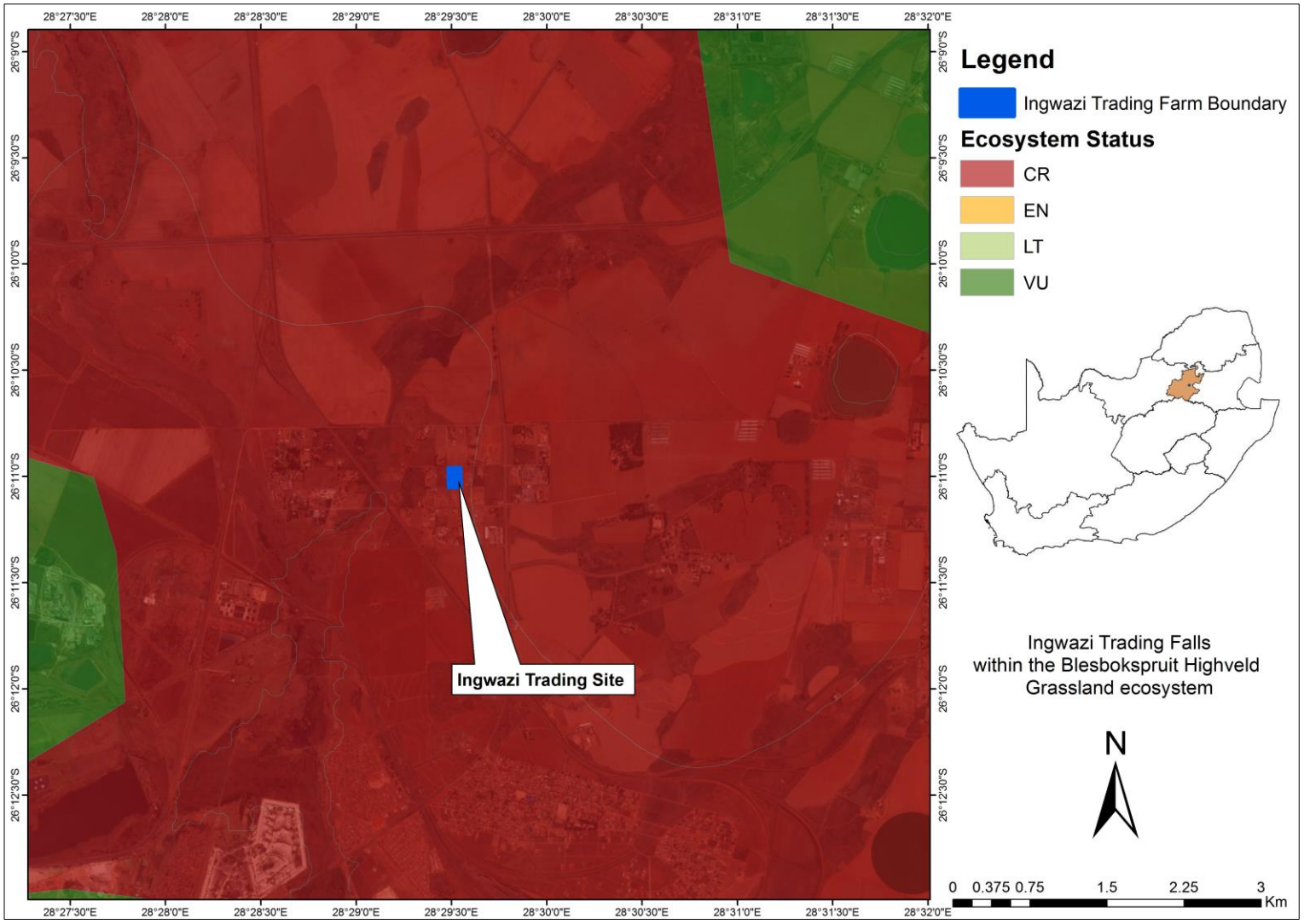


Figure 9: Regional location of the 1.7ha site within the original extent of the Blesbokspruit Highveld Grassland, a threatened ecosystem.Data source:SANBI, 2011.

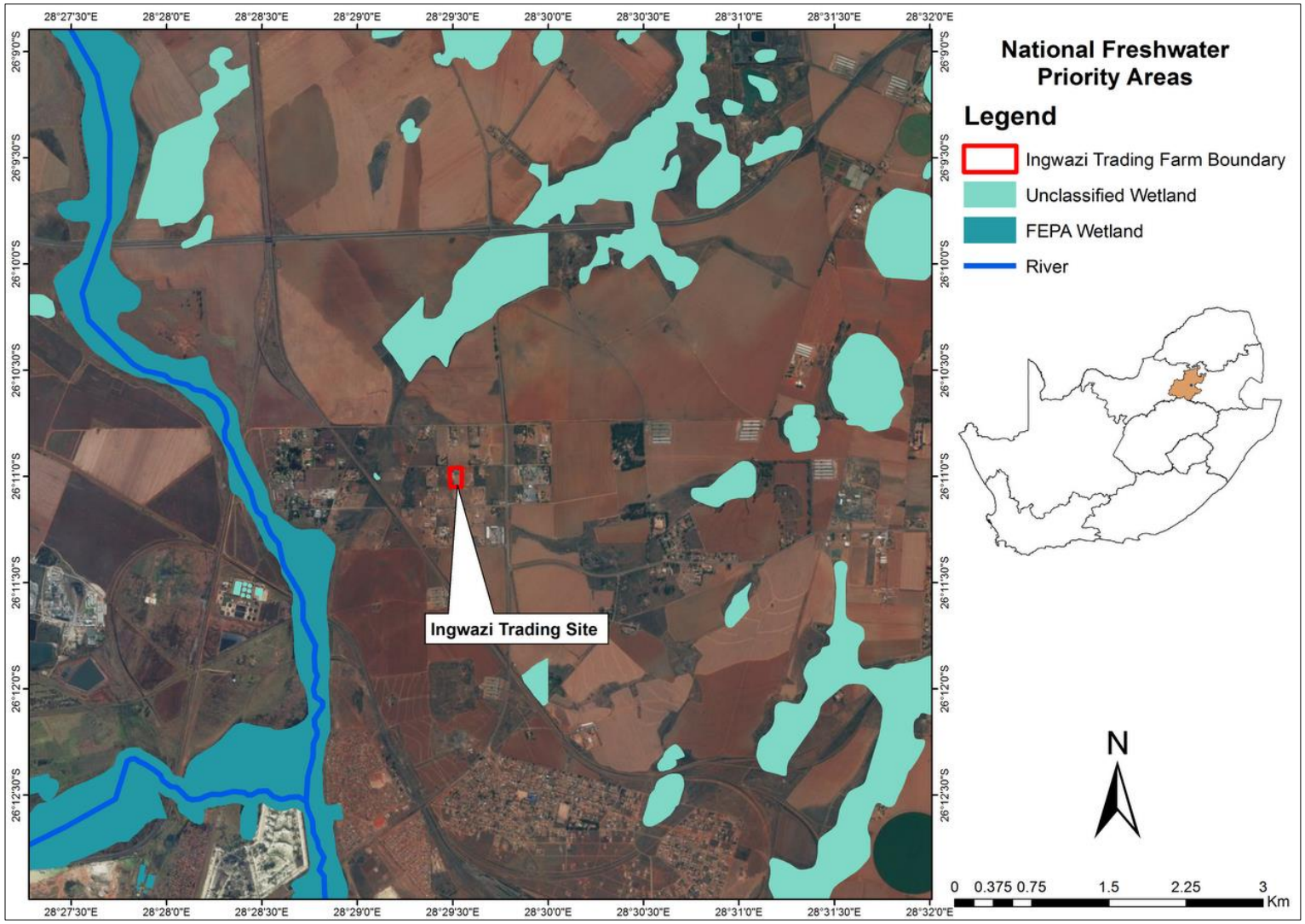


Figure 10: Location of the site in relation to the regional Freshwater Ecosystem Priority Areas.Data source:CSIR, 2011.

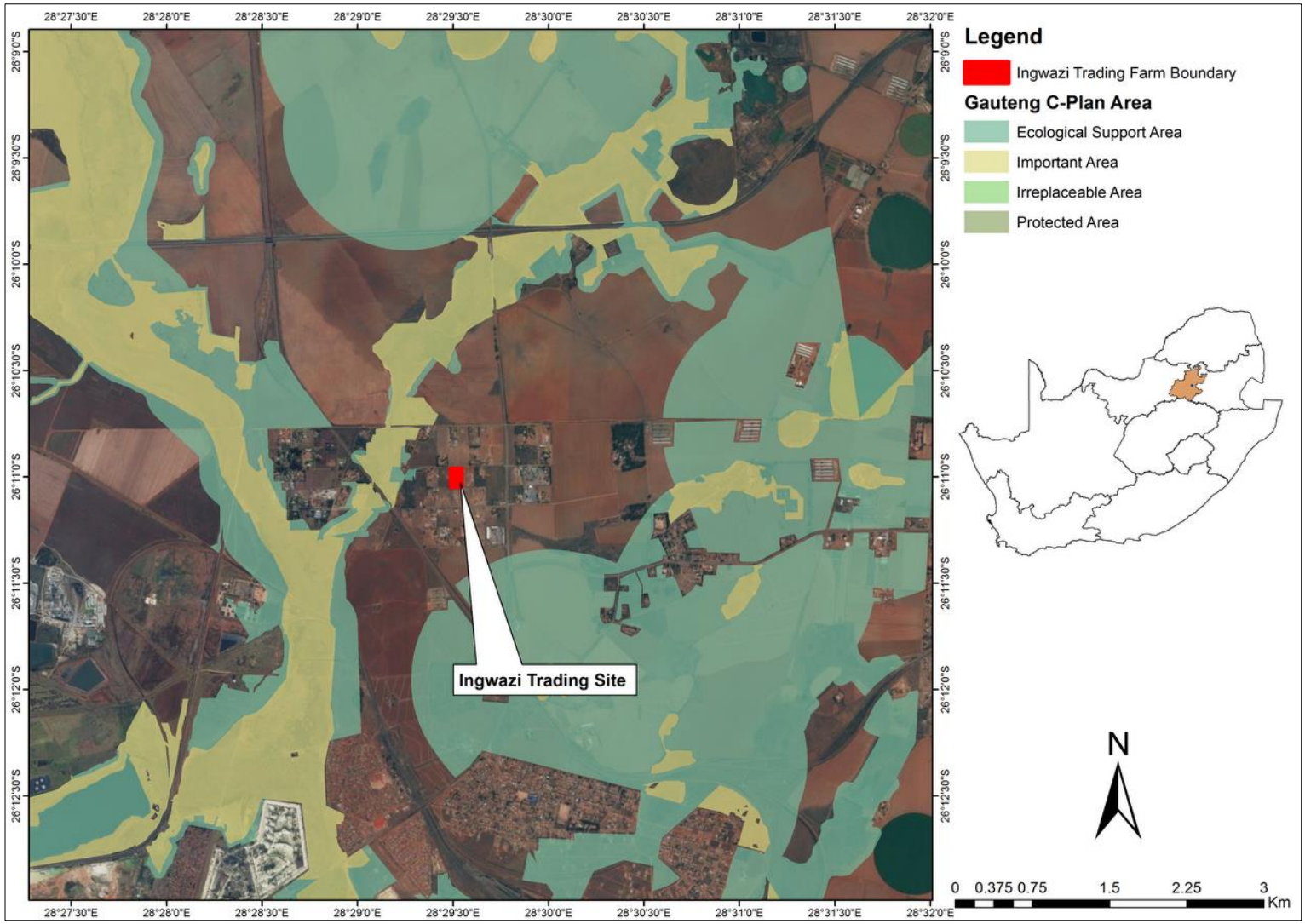


Figure 11: Location of the site in relation to the Gauteng C-Plan V3.3 CBAs and ESAs. Data source:GDARD, 2011.

6. FIELD ASSESSMENTFINDINGS

6.1 Land use and existing impacts

The infrastructure that currently exists on site includes the chicken egg layer facilities (three houses), which will be upgraded and extended, the main residential area and a vegetable garden (Figure 14). The vegetable garden is located in the north western corner of the site. The residential quarters, vegetable garden and first chicken house are fenced off from the rest of the site. The site where the proposed new chicken houses will be located is relatively flat, consists of mainly several goat or sheep pellets and cow dung spotted on the ground (Figure 12).There are a number organic waste dump sites and a dug pit on site (Figure 13). There are a number of large Blue gum (*Eucalyptus spp*) trees in the south west most corner of the site.

Historical aerial imagery (from the previous 14 years) indicates that the site has, overall, remained the same (Figure 14&15). The secondary grassland area has been disturbed in the past. The previous vacant neighbouring areas have been expanded into residential areas.

Figure 12: Presence of animal droppings is evidence of cattle, sheep and/or goats present on site. Photo credit: Rirhandzu Marivate.

Figure 13: Organic waste disposal sites and dug pits present on site.
Photo credit:Rirhandzu Marivate.

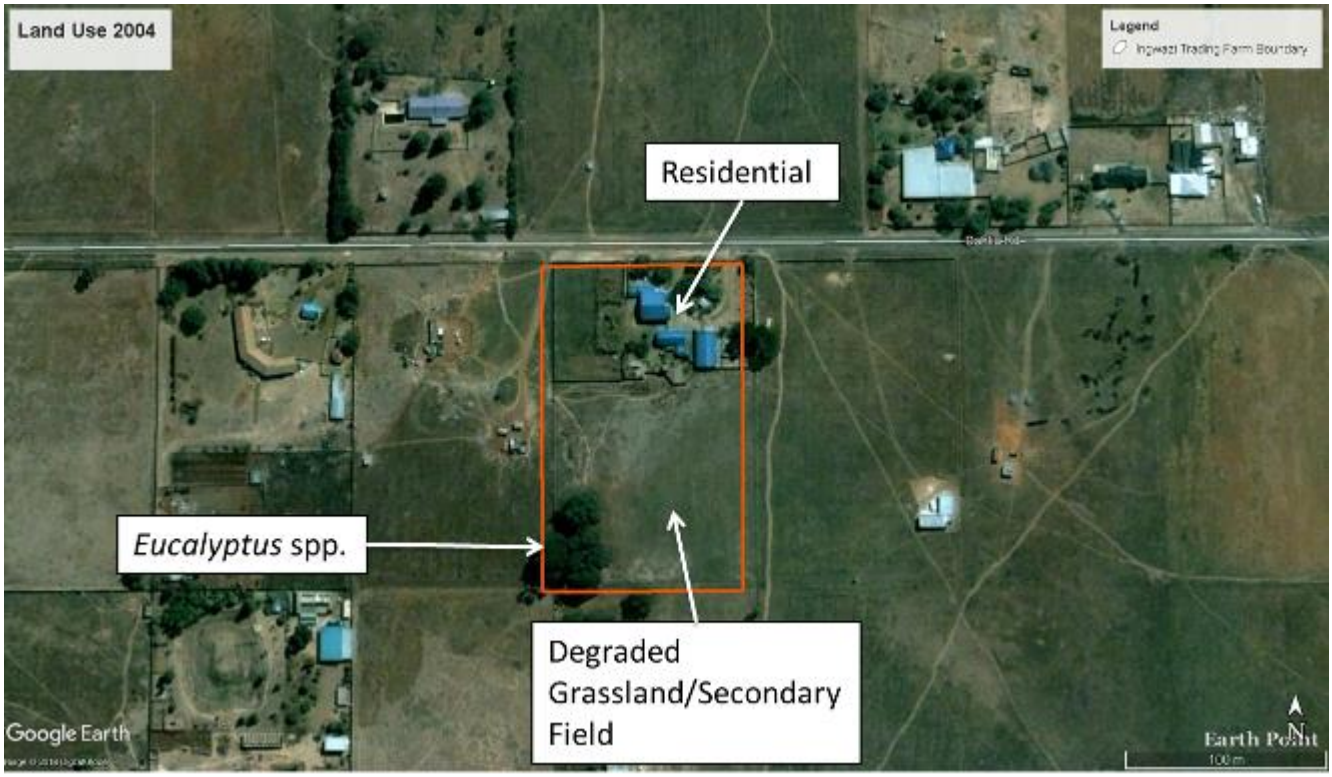


Figure 14: Aerial Image of the site in the year 2004 (first image) and 2012 (second image). Data source: Google Earth, 2018.

Figure 15: Aerial image of the site in the year 2017. Data source: Google Earth, 2018.

6.2 Vegetation Communities/Habitats

SANBI collates floral data within southern Africa and update their database system called the National Herbarium Pretoria (PRE) Computerised Information System (PRECIS). This database is captured according to the quarter degree squares (QDSs), and referred to as the POSA database. The study site falls under QDS 2628AB. According to the POSA database, the dominant families are Poaceae & Asteraceae. The structural representation of the site, with graminoids being most dominant, followed by low shrubs, and the herbaceous plants, represents a typical grassland habitat.

6.2.1 Vegetation recorded on site

During the site visit is was observed that the majority of the vegetation on site was modified or degraded from the reference state of the Soweto Highveld Grassland, with an infestation of alien vegetation. The plant species recorded at the time of this assessment are listed in Table 1. The degraded vegetation is further discussed below.

The land can be classified as modified and include areas that are highly modified (complete loss of species composition and structure). It consists primarily of anthropogenic land cover types such as built up land and infrastructure, unnatural vegetation cover such as pastures, vegetable garden or areas dominated by alien invasive plant species (Figure 16). The species diversity in the modified area was low with only nineteen (19) species recorded (Table 3). The existing infrastructure and pasture does not resemble the natural state of the Soweto Highveld Grassland and thus were grouped as a Transformed vegetation community.

The site has been transformed from past land use and current land use and is dominated by patches of graminoids which have a monospecific species composition (i.e. low diversity) (Figure 16). The Graminoid layer is dominated by *Eragrostis curvula,* and *Cynodon dactylon*. Other plants that are present are shrubs and herbaceous in nature (Figure 18).

Alien invasive plants are a major threat to the ecological functioning of natural systems and to the productive use of the land. The study site has been transformed but does not have dense infestations of alien species. There are a number of large tree species including *Eucalyptus camaldulensis* and succulent shrubs such as *Opuntia ficus-indica.*

Figure 16: Photographs of site, showing mowed grasses, large trees, and pastures; the Transformed Vegetation Community. Photo credit: Rirhandzu Marivate.

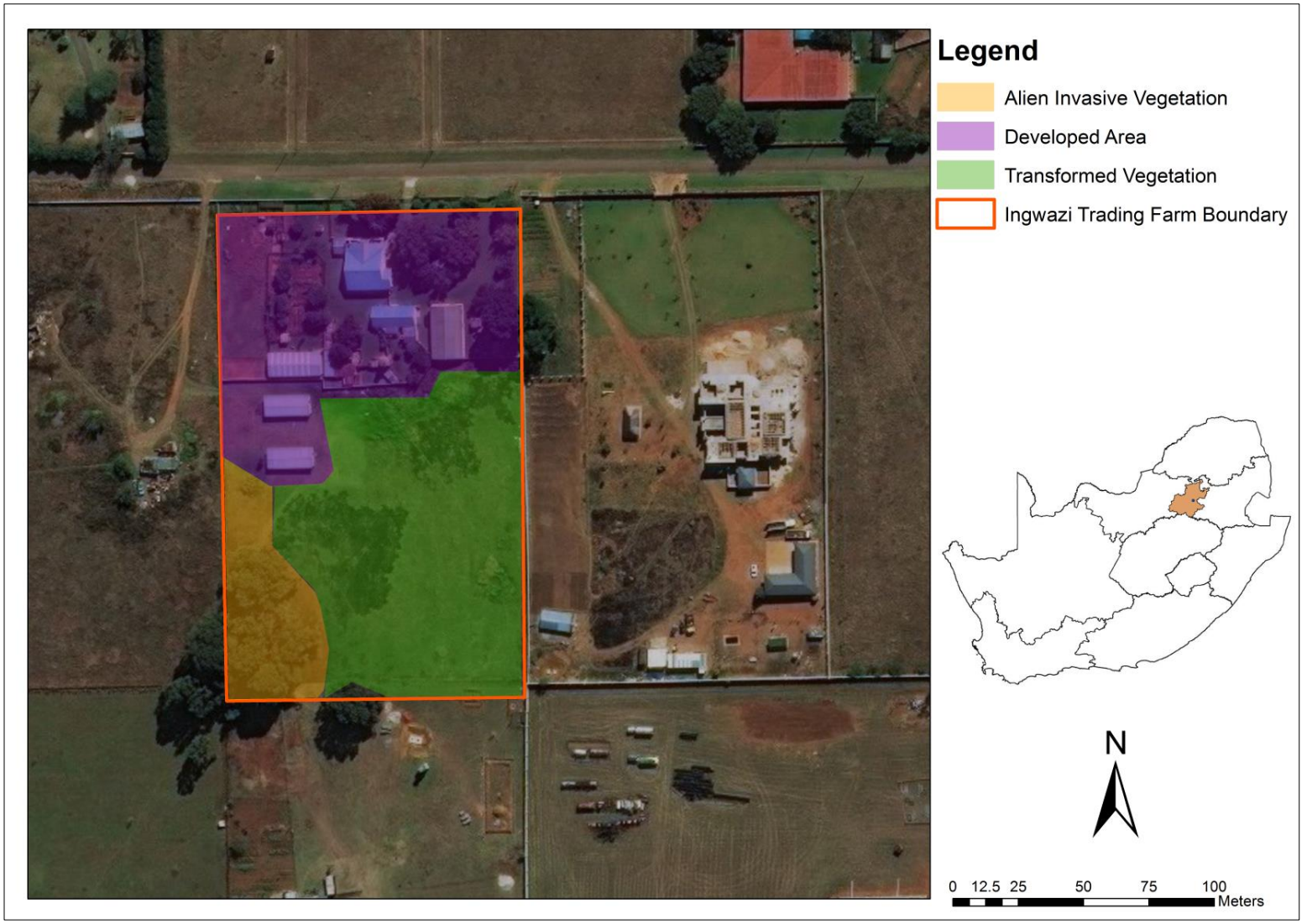


Figure 17: Land cover types identified on Ingwazi Trading smallholding.Data source: Google Earth, 2018.

Table 1: Plant species recorded on the development site

Family	Taxon Name	Threat Status	Growth Form
ASTERACEAE	*Arctotis arctotoides*	Least Concern	Herb
NYCTAGINACEAE	*Boerhavia diffusa*	Alien	Herb
COMMELINACEAE	*Commelina cf africana var. barberae*	Least Concern	Herb
ASTERACEAE	*Conyza sumatrensis*	Alien	Herb
CUCURBITACEAE	*Cucumis zeyheri*	Least Concern	Herb
POACEAE	*Cynodon dactylon*	Least Concern	Graminoid
FABACEAE	*Elephantorrhiza elephanthina*	Least Concern	Dwarf Shrub
POACEAE	*Eragrostis curvula*	Least Concern	Graminoid
MYRTACEAE	*Eucalyptus camaldulensis*	Alien Category 1b	Tree
ASTERACEAE	*Helichrysum rugulosum*	Least Concern	Herb
MALVACEAE	*Hermannia transvaalensis*	Least Concern	Herb
SCROPHULARIACEAE	*Nemesia fruticans*	Least Concern	Dwarf Shrub
ASTERACEAE	*cf Nidorella anomala*	Least Concern	Herb
CACTACEAE	*Opuntia ficus-indica*	Alien Category 1b	Succulent Shrub
OXALIDACEAE	*Oxalis sp*	N/A	Geophyte
BRASSICACEAE	*Erucastrum austroafricanum*	Not Evaluated	Herb
SOLANACEAE	*Solanum campylacanthum Hochst. ex A.Rich. subsp. panduriforme*	Least Concern	Herb
ASTERACEAE	*Tagetes minuta*	Alien	Herb

Arctotis arctotoides Solanum campylacanthum subsp panduriforme

Eragrostis curvula *Hermannia transvaalensis*

Figure 18: Examples of plant species that were recorded on site visit of 30 November 2017. Photo credit:Rirhandzu Marivate

6.2.2 Review of Plants of Conservation Importance

6.2.2.1 Threatened or Protected Plant Species (TOPS)

As stated previously, threatened and protected species (TOPS) are listed in Chapter 4, part 2 of the NEMBA Regulations, and classifies as Critically Endangered (CN), Endangered (EN), Vulnerable (VU), and Protected (PT).

Certain activities, known as 'Restricted Activities', are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling. The first list of threatened and protected species published under NEMBA was published in the government gazette on the 23rd of February 2007 along with the Regulations on Threatened or Protected Species. No TOPS species were recorded on the site.

6.2.2.2 Red and Orange listed plant species

South Africa has also listed plants of conservation concern for the purpose of informing conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining (Figure 19). These plants are also referred to as Red or Orange Listed plants.

The Threatened Species Programme of the South African National Biodiversity Institute (SANBI) published the Red List of South African Plants (Raimondo *et al*, 2009), with an online database that is updated regularly and provides information of the national conservation status of South African indigenous plants. Table 2 provides a list of all listed plants as recorded in POSA (2018) in QDS 2628AB.

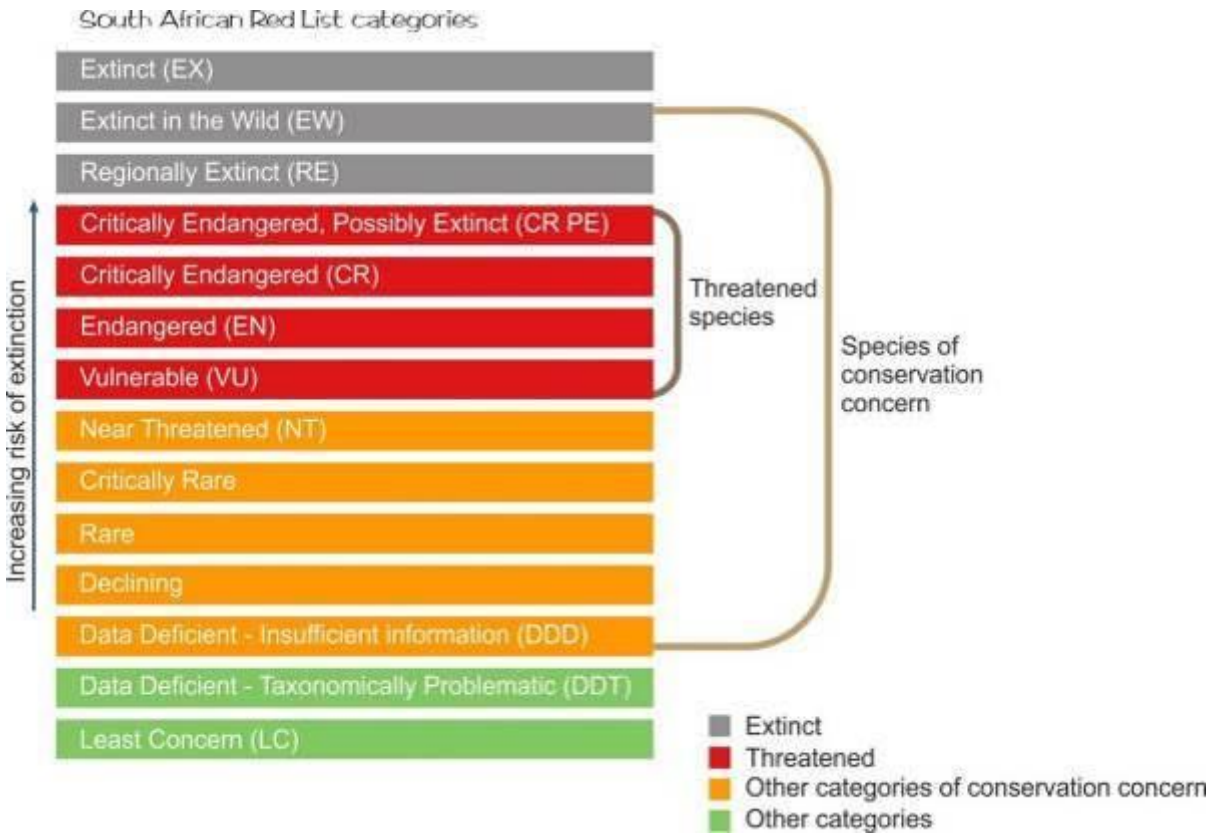


Figure 19: Threatened species and species of conservation concern. Diagram source: http://redlist.sanbi.org/redcat.php

Table 2: listed plants of conservation concern recorded in QDS 2628AB. Data source: POSA, 2017

Family	Species	Threat status	Growth forms
AMARYLLIDACEAE	*Crinum bulbispermum (Burm.f.) Milne-Redh. & Schweick.*	Declining	Geophyte, hydrophyte
APOCYNACEAE	*Pachycarpus suaveolens (Schltr.) Nicholas & Goyder*	VU	Herb, succulent
ASPHODELACEAE	*Kniphofia typhoides Codd*	NT	Herb, succulent
FABACEAE	*Indigofera hybrida N.E.Br.*	VU	Herb
IRIDACEAE	*Gladiolus robertsoniae F.Bolus*	NT	Geophyte, herb

There were no Red or Orange listed plant species found on site.

6.2.3 Alien Invasive Plant Species

In August 2014 the list of Alien Invasive Species was published in terms of NEMBA (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the

Government Gazette No. 37886, 1 August 2014. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). Declared weeds and invasive plant species tend to replace and dominate the tree and herbaceous layers of natural ecosystems; and in some cases exclude native plant species because of their superior competitive capabilities. These alien and invasive species transform the composition, structure and function of the natural ecosystems. It is of high importance that these plants are controlled and eradicated (Henderson, 2001).

In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within close proximity to a watercourse.

Below is a brief description of the three categories in terms of NEMBA:

- *Category 1a*: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- *Category 1b*: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- *Category 2*: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- *Category 3*: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

The Category 1 alien plant species identified on the study site are listed below in Table 3 and shown in Figure 20. According to the regulations, a person who has under his or her control a Category 1b listed invasive species must immediately:
(a) notify the competent authority in writing
(b) take steps to manage the listed invasive species in compliance with
    (i) section 75 of the Act;
    (ii) the relevant invasive species management programme developed in terms of regulation 4; and
    (iii) any directive issued in terms of section 73(3) of the Act.

Table 3: **Category 1 invasive species recorded on or adjacent to the site**.**Data source:DEA,2016**

Species	Common Name	NEMBA Category
Eucalyptus camaldulensis	Red river gum	Category 1b
Opuntia ficus-indica	Sweet Prickly Pear	Category 1b

Figure 20: Large alien invasive vegetation found on site. A) *Opuntia ficus-indica*, B) *Eucalyptus camaldulensis*. Photo credit: Rirhandzu Marivate

6.3 Fauna

The following section provides information on mammal, bird, reptile, frog, butterfly, odonata and scorpion species (including those that are threatened) that are considered likely to occur the area or near the development site.

6.3.1 Mammals

According to the MammalMAP (2018), approximately 23 mammal species have been observed to occur in the QDS covering the study site and mostly represent rodents, insectivores, carnivores and bats. Terrestrial mammals that are likely to occur on site include the Striped Mouse, Single Striped Mouse, Common mole-rat and Slender Mongoose (Figure 21). Table 4 provides a list of threatened mammal species that were recorded in the QDS. There were three conservation important (CI) identified within the region, only the the African White-tailed rat, considered endangered, has a medium likelihood of occurring on site.

Figure 21:Potential habitat for Slender Mongoose (*Herpestes sanguineus)* burrow observed during the site visit.Photo credit: Rirhandzu Marivate.

Table 4: List of threatened and nationally protected mammal species recorded in QDS 2628AB. Data Source:Friedmann & Daly, 2004.

Scientific Name	Common Name	Red List Status	Habitat (Child, et al., 2016)	LoO
Ourebia ourebi	Oribi	Endangered	Inhabit savanna woodlands, floodplains and open grasslands, prefering open grassland in good condition containing both short grass for feeding and long grass for feeding and shelter.	Low
Leptailurus serval	Serval	Near Threatened	The serval is found around marshland, well-watered savanna and long-grass environments, and are associated with read beds and other riparian vegetations types. Typical habitat requirement is long, rank grass, vegetation that can provide cover.	Low
Mystromys albicaudatus	African White-tailed rat	Endangered	Often associated to calcrete soils within grasslands, and never found on soft, sandy substrate, rocks, wetlands or river banks. They also occur in disturbed areas and in sparse grasslands and are adapted to the Highveld winter	Medium

6.3.2 Birds

The small size of the site and the disturbed nature of the habitat, collectively mean that avian diversity is low.Approximately 277 bird species are listed for pentad 2610_2825 (SABAP2, 2018). Appendix 3 provides the 277 bird species that have been recorded in this pentad. The five bird species that were recorded during the site visit on 30 November 2017 are provided in Table 5 and these are recognised as being the dominantgroups of birds within the regions of the development site such as bishops, doves, shrikes, swallows, swifts, etc. These bird species are more tolerant of crop cultivation, human settlement, livestock grazing and other human-induced activities.

Table 5: Local bird species that were observed on site.Data Source:Taylor, et al. 2015.

Common Name	Scientific Name	Red Data Listed
Yellow-crowned Bishop	*Euplectes afer*	Least Concern
Barn Swallow	*Hirundo rustica*	Least Concern
Common Swift	*Apus apus*	Least Concern
White-throated Swallow	*Hirundo albigularis*	Least Concern
Laughing Dove	*Streptopelia senegalensis*	Least Concern

Threatened or nationally Protected bird species are recorded to occur in pentad 2610_2825 (SABAP2, 2018) which covers an area of approximately 10 km x 10 km are listed in Table 6 below:

Table 6: List of threatened and nationally protected bird species recorded in pentad 2610_2825.Data Source: Taylor, et al. 2015.

Scientific Name	Common Name	Red Data Listed	No of Observations in QDS (Rep Rate%)	LoO
Oxyura maccoa	Duck, Maccoa	Near Threatened	1.7	Low
Polemaetus bellicosus	Eagle, Martial	Endangered	0.1	Low
Aquila verreauxii	Eagle, Verreaux's	Vulnerable	0.1	Low
Phoenicopterus ruber	Flamingo, Greater	Near Threatened	18.35	Low
Phoenicopterus minor	Flamingo, Lesser	Near Threatened	7.28	Low
Circus maurus	Harrier, Black	Endangered	0.1	Low
Circus macrourus	Harrier, Pallid	Near Threatened	0.1	Low
Eupodotis caerulescens	Korhaan, Blue	Least Concern	0.32	Low
Mirafra cheniana	Lark, Melodious	Least Concern	0.1	Low
Pelecanus onocrotalus	Pelican, Great White	Vulnerable	0.1	Low
Anthus chloris	Pipit, Yellow-breasted	Vulnerable	0.95	Low
Glareola nordmanni	Pratincole, Black-winged	Near Threatened	0.1	Low
Sagittarius serpentarius	Secretarybird, Secretarybird	Vulnerable	0.32	Low
Leptoptilos crumeniferus	Stork, Marabou	Near Threatened	0.1	Low

6.3.3 Reptiles

Fourteen reptile species are considered highly likely or likely to occur in or near the development site according to records for QDS 2628AB from ReptileMAP (2018), (Table 7) and represent mainly snakes and lizards. Reptile species that have a high likelihood of occurring on site include Speckled Rock Skink, Rinkhals, Common Dwarf Gecko, Aurora House Snake, Highveld Garter Snake, Delalande's Sandveld Lizard, Spotted Grass Snake, Cape Skink, Bibron's Blind Snake, and Rhombic Egg-eater. The Termitaria (Figure 22) and animal burrows (Figure 18) observed on site represent important habitat for many potentially occurring reptile species; harlequin snakes have a slight

possibility of occurring, but their likelihood is low due to the degraded nature of the site and they have not been recorded in the QDS. There are no recorded conservation important reptile species that may potentially occur within the QDS or on the project site.

Figure 22: Termitaria observed during the site visit.Photo credit: Rirhandzu Marivate.

Table 7: Reptiles that are observed to occur within QDS 2628AB where the development site is located.Data Source: Bates, et al. 2014.

Family	Scientific Name	Common Name	Red List Status	Habitat (Bates, et al., 2014)	LoO
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	Least Concern	It is often found in deserted termitaria, under rocks, in rock crevices, under bark of trees and in rotting logs.	High
Elapidae	*Elapsoidea sundevallii subsp. media*	Highveld Garter Snake	Least Concern	Found in a wide variety of habitats, especially in alluvial and aeolian sands. The refugia of the snake include old termitaria and under rocks.	High
Elapidae	*Hemachatus haemachatus*	Rinkhals	Least Concern	Limited to open grassland, rocky outcrops and margins of wetlands. Some times common in localities and peri-urban areas.	High
Gekkonidae	*Lygodactylus capensis subsp. capensis*	Common Dwarf Gecko	Least Concern	Found in arboreal in savanna habitats but adapts readily to urban situations. and rapidly expanding its range, but not in natural areas.	High
Lacertidae	*Nucras lalandii*	Delalande's Sandveld Lizard	Least Concern	Associated with montance and temperate grasslands, as well as coastal fynbos habitat in the southern Cape. It shelters in burrows in ther ground or under rocks. Frequently found in high altitude areas.	High

Family	Scientific Name	Common Name	Red List Status	Habitat (Bates, et al., 2014)	LoO
Lamprophiidae	*Lamprophis aurora*	Aurora House Snake	Least Concern	Commonly found in grassland, fynbos and moist savanna habitats. Occuring from coast, to the plateau of the Highveld. Often found near streams, under rocks and some times in old termitaria	Medium
Lamprophiidae	*Lycodonomorphus rufulus*	Brown Water Snake	Least Concern	Associated with aquatic habitats including dams, streams and rivers.	Low
Lamprophiidae	*Lycophidion capense subsp. capense*	Cape Wolf Snake	Least Concern	Mainly occurs in coasta regions to higher elevations in the central parts of South Africa. Often found under rocks or logs and in ord termitaria	Medium
Lamprophiidae	*Psammophylax rhombeatus rhombeatus*	Spotted Grass Snake	Least Concern	It is very common and found in savanna, grassland, fynbos and desert, from the coast up to about 2 300m. It sheters under rocks on soils, in rock crevices, old termitaria and holes in the ground.	High
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	Not Evaluated	Occurs in fresh or stagnant water bodies that include seasonal pans, flooded quaries and farm dams. Avoids mountainous terrain, forests and desert region. Able to withstand droughts by burrowing into moist soil, sometimes away from its usual aquatic habitat, and emerges after rains.	Low
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	Least Concern	Found in rupicolous and/or semi-arboreal, in rocky outcrops, trees and houses, and largely along the escarpment and on the Highveld. Found mainly in KwaZulu-Natal Midlands to elevations of 2600 m on the Drakensberg escarpment.	High
Scincidae	*Trachylepis capensis*	Cape Skink	Least Concern	Terrestrial species found in all major biomes in South Africa. Very abundant in grassland, savanna and fynbos at altitudes of 0-2300m. Has been recorded from rocky areas, open veld, holes in disused termite ounds and arouns houses. At times digs tunnels at the base of vegetaion or rocks, and is also fond of areas with mats of dead leaves.	High
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	Least Concern	Burrows in loose soil and moves into surface soils in serarch of macro-invertebrate prey items, especially after rain. Found in old termitaria, and in or on soil under rocks and rotting logs.	High

6.3.4 Frogs

Approximately fourteen frog species are considered highly likely or likely to occur in QDS 2628AB, according to FrogMAP (2018). The study site is however, far from the Blesbokspruit, and wetland areas, additionally the site is highly disturbed. The likelihood of any frog species occurring on the site is thus medium to low, especially for the Giant Bull Frog (a near threatened species), which prefers to bury themselves several hundred meters away from shallow wetland areas, that serve as their breeding grounds (FrogMAP, 2018), Some hardier frog species such as the Olive and Guttural toads are more likely to be present on the site seeking refuge under fallen logs, mats of vegetation and even abandoned termitaria (FrogMAP, 2018). Table 8, provides a list of frog species that have been observed in QDS 2628AB.

Table 8: Frog species that have been observed in QDS 2628AB.Data Source: Minter, et al., 2004.

Family	Scientific Name	Common Name	Red List Status	Habitat (Minter, et al., 2004)	LoO
Brevicepitidae	*Breviceps adspersus*	Bushveld Rain Frog	Least Concern	Found in semi-arid habitats with sandy to sandy-loam soils, mainly in the Savanna Biome. Particularly in the bushveld vegetation types that are charecterised by grassy ground layer and upper layer of woody plants. Absent in Grassland and Forest biomes	Low
Bufonidae	*Schismaderma carens*	Red Toad	Least Concern	Found in a variety of vegetation types, particularly in the Savanna biome, and often found in Grassland vegetation. Prefered breeding in deep, muddy pools or dams.	Low
Bufonidae	*Sclerophrys garmani*	Olive toad	Least Concern	Found in various bushveld vegetation types in the Savanna Biome, particularly within well-wooded, low lying areas with high day time temperatures. Day time they are found under fallen logs, rocks, mats of vegetation, abandoned termitaria, or any objects that provide shelter. They breed in various places including farm dams, ornamental ponds, in urban areas.	High
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	Least Concern	Found in habitats various vegetation types in the Savanna, Grassland and Thicket biomes. It is sometimes found in forest clearings and forest/grassland ecotones, and wooded banks of the Gariep river.They have been found in termitaria and in the burrows of large lizard. They shelter under logs, rocks and other object in day time. As well as drain-pipes and gutters, burrows or in holes excavated in soft ground.	High
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	Least Concern	Found in a variety of vegetation types in the Savanna and Grassland biomes, while breed in temporary and permanent water bodies, that include well vegetated shallow pans, vleis, marshes and deep dams.	Low

Family	Scientific Name	Common Name	Red List Status	Habitat (Minter, et al., 2004)	LoO
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	Least Concern	Found in mainly the Grassland and Savanna biomes where the summer rainfall is >500mm. P. natalensis is tolerant of human disturbance and is often found near human habitation.	Medium
Pipidae	*Xenopus laevis*	Common Platanna	Least Concern	inhabiting all biomes in South Africa, in streams, rivers and pools. Also found in man-made water bodies such as farm dams, ponds, sewage purifucation works and fish farms.	Low
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	Least Concern		Unknown
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	Least Concern	Found mainly in Grassland and Fynbos biomes. Occurs in winter and summer rainfall areas and uses the same habitats throughout the year. It is associated with permanent springs, ponds and farm dams in dry northwest, while occur along most well-vegetated waterways elswhere.	Low
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	Least Concern	Prefers open areas with short vegetation and is especially abundant in grassy areas. Known to tolerate drier habitats, but also occurs in high rainfall areas. Breeds in almost any small, temporary water body, such as pools in inundulated grasslands, culverts and other rainfilles depressions	Medium
Pyxicephalidae	*Pyxicephalus adspersus*	Giant Bull Frog	Near Threatened	Inhabits varions vegetation types in the Grassland, Savanna, Nama Karoo and Thicket biomes. Breeding occurs in seasonal, shallow, grassy pans in flat, open areas; some times use non-permanent vleis and shallow water on the margins of waterholes and dams. They prefer sandy soils, bt sometimes inhabit clay soils.	Medium
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	Least Concern	Mainly found in the winter-rainfall region of Western Cape, as well as the summer-rainfall region in the north. Inhabits most vegetation types including Fynbos, Succulent Karoo, Nama Karoo, Savanna, Grassland, Thicket and Forest biome.	Low
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	Least Concern	Found in various vegetation types in the Savanna and Grassland biomes. Breed in shallow, standing water at the edges of dams, pans and small bodies of water such as roadside puddles.	Medium
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	Least Concern	Found in various of vegetation types in Grassland and Savanna biomes and breed in streams, rivers or other places	Low

Family	Scientific Name	Common Name	Red List Status	Habitat (Minter, et al., 2004)	LoO
				where water flows slowly, but not standing still.	

6.3.5 Butterflies

Based on LepiMAP (2018), 86 species of butterfly have been recorded in QDS 2628AB. Furthermore, 44 species are likely to occur based on habitat and distribution descriptions provided in Mecenero, et al. (2013) for QDS 2628AB. Most of the butterflies recorded are most likely to occur or at least pass through the site. Two butterfly species were encountered during the site visit (see Table 9), all of which have previously been recorded in QDS 2628AB.

Table 9: Local butterfly species encountered on site during the site visit undertaken on 30 November 2017. Data Source:Mecenero, et al. 2013, IUCN, 2017.

Common Name	Scientific Name	Red Data Listed
African grass blue	*Zizeeria knysna knysna*	Least Concern
Broad-bordered grass yellow	*Eurema brigetta brigitta*	Least Concern

The butterfly species that were observed on site and those that are potentially occurring are considered common and widespread. There are, however, a number of conservation important butterfly species that are thought to occur in the region of the development site, these are listed in Appendix 2.

6.3.6 Odonata

OdonataMAP (2018) indicates that approximately 19 species are likely to occur within the above mentioned QDS (Table 10). No dragonfly or damselfly species were observed during the site investigation. Additionally, most odonata species are likely to occur in riparian areas, and as previously stated the project site occurs far from any river or wetland; many of the species prefer aquatic landscapes as habitats. No potentially occurring odonatan specieshave been listed as threatened or protected, see Table 10.

Table 10: Odonata (dragonfly and damselfly) species observed to occur in QDS 2628AB.Data Source: Odonata, 2018.

Scientific Name	Common Name	Red List Status	Habitat	LoO
Africallagma glaucum	Swamp Bluet	Not Listed	Found in most parts of South Africa. Inhabits various types of still waters including pools, dams and quiet reaches of streams and rivers where there are swampy areas with lush, short grasses and sedges.	Low

Scientific Name	Common Name	Red List Status	Habitat	LoO
Orthetrum julia	Julia Skimmer	Not Listed	Found in most part of South Africa. Occurs in dappled shade in thick bush or forest over pools or still reaches of rivers. Can often be found in gardens and along hedgerows.Females commonly enter houses.	Medium
Anax ephippiger	Vagrant Emperor	Not Listed	Found in most of the eastern and northern regions of South Africa. Breeds in flooded shallow grassy pools, often those fringing larger pools.	Low
Anax imperator	Blue Emperor	Not Listed	Widespread and common throughout most of South Africa.Flies mostly around pools and dams with abundant waterweeds, lilies and fringing reeds. Sometimes found hawking over grassland about 2 m above the ground.	Medium
Azuragrion nigridorsum	Sailing Bluet	Not Listed	It occurs at pools, vleis and small lakes usually fringed with bushes or trees and with an abundance of grasses, sedges and lilies. Occasionally also occurs at grassy margins of slow river reaches.	Low
Ischnura senegalensis	Tropical Bluetail	Not Listed	Very common throughout South Africa. Found in stagnant habitats with high dung input from mammals and in habitats severely disturbed by humans. Know to tolerate slightly brackish conditions; and conspicuous when it flits and rests among reeds, sedges and grasses in marshy areas.	Medium
Pseudagrion salisburyense	Slate Sprite	Not Listed	Common throughout South Africa, and occurs in sluggish or still reaches of streams and rivers with an abundance of reeds, grasses and herbs. Some times common in farm dams, and some natural pools and waterholes. It rests along a grass stem or reed blade overhanging the water.	Low
Lestes pallidus	Pallid Spreadwing	Not Listed	Very patchy and localised distribution on South Africa. Living in semi-permanent, shallow pools and pans, with short, emergent sedges and grasses, mostly in open savanna.	Low
Brachythemis leucostocta	Southern Banded Groundling	Not Listed	Prefers dry, grazed savanna with pools, dams and sluggish reaches or rivers. Often found away from water along dirt tracks between trees and on fringes of receding pools with muddy beaches. Flies low to the ground, often following the observer as it would normally follow walking game so as to catch small insects. usually perches on the ground, and at times on dry vegetation.	Medium
Diplacodes lefebvrii	Black Percher	Not Listed	Inhabits pools, swamps, marshes, tarns and occasionally quiet reaches of rivers with an abundance of tall grasses and other swamp vegetation.	Low
Orthetrum caffrum	Two-striped Skimmer	Not Listed	Occurs around montane pools and still reaches of streams and rocky rivers, and some times in marshes. It perches on sticks or reeds over the water.	Low
Orthetrum trinacria	Long Skimmer	Not Listed	Occurs along the grassy margins of streams. It is a strong flyer at the water's edge and over marshy areas where it frequently perches on reeds on stems, usually over water.	Low
Rhyothemis semihyalina	Phantom Flutterer	Not Listed	Inhabits shallow, marshy pools with an abundance of lilies and fringed with tall grasses and reeds. Sometimes found flying around tree tops.	Medium
Sympetrumfonscolombii	Red-veined Darter or	Not Listed	It is a migratory species, especially in early summer.It breeds in the margins of pools and dams with an	Low

Scientific Name	Common Name	Red List Status	Habitat	LoO
	Nomad		abundance of tall grasses and reeds. Has been found in grassland, some times far from water.	
Urothemis edwardsii	Blue Basker	Not Listed	Occurs around reedy pools and marshes and is usually seen perching on reed tips ant the edge of the water or on twigs on the bank. It is sometimes seen perching on bushes on grassland away from water.	Medium

6.3.7 Scorpions

Approximately two scorpion species have been observed to occur in QDS 2628AB, where the study site falls (ScorpionMAP, 2018), namely *Opistophthalmus pugnax* and *Uroplectes triangulifer*. These species may occur on the development site, because of the available habitat conditions that exist, such as the termitaria.

6.4 Local Areas of Conservation Significance

The sites natural sensitivity can be mapped in terms of its conservation significance. The mapping is based on ecological sensitivity, the extent of disturbance, the presence of conservation important species, and conservation value. In terms of the Gauteng Conservation Plan (C-Plan), the property site is not designated for biodiversity management and conservation.

Areas within the development site are ranked on biodiversity conservation significance and the scoring ranges from: High, Medium-high, Medium, Medium-low to Low. The scoring was determined by the information that is available for the area and the site visit. Based on the findings from all the information available, a map indicating the relative conservation significance of areas within the development site is presented in figure 23. The rating Includes:

Moderate rated areas include:

- Disturbed Grassland, is disturbed and transformed, with a number or indigenous plant species still occurring, which have been identified on the development site.

Moderate-low areas include:

- Areas with transformed vegetation and alien and invasive plant species.

Low rated areas include:

- Infrastructure
- Areas stripped of vegetation.

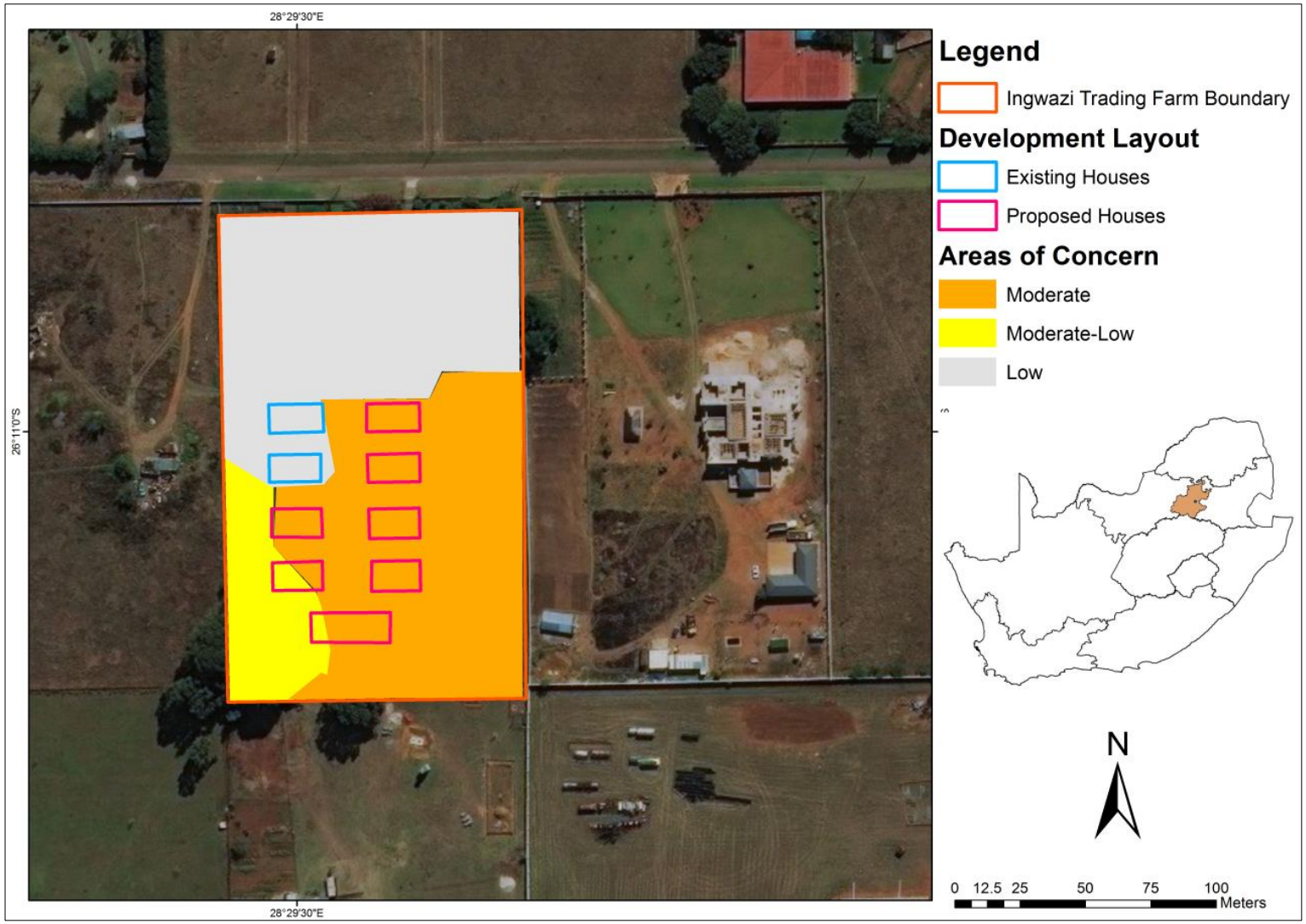


Figure 23: Environmental sensitivity of the Ingwazi Trading development site.Data source: CSIR,2017; Google Images, 2018

7. IMPACT ASSESSEMENT AND MANAGEMENT ACTIONS

This section provides an assessment of the predicted impacts of the proposed expansion of the chicken layer facility on the local ecology, including mitigation and monitoring actions. The approach and terminology used for the impact assessment are provided in Appendix 4.

Based on the analysis of the ecology of the site, the following potential impacts and management actions were identified, with detailed impact assessments provided in Tables 11,12 &13:

Construction phase:

1. **IMPACT: Project footprint on transformed terrestrial vegetation and faunal habitat**
   The development of six chicken houses (8.5 m x 30m each) and a brooder house (3m x 9m) will cover a total area ofapproximately 1600 m^2. There are three existing chicken houses, transformed vegetation and alien vegetation on site. The habitat being lost has been identified to be of low conservation value (refer to section 6.4). Taking into consideration these factors, and that the area is zoned for agriculture, the impact of the project footprint on the surrounding ecosystems is predicted to be of Medium significance.

   MANAGEMENT ACTIONS:
   Avoid the unnecessary loss of vegetation and faunal habitats and promote the re-establishment of indigenous vegetation in disturbed areas.
   - Ensure that construction areas are well demarcated and restrict clearing of vegetation to minimize loss of vegetation and faunal habitats.
   - Replant indigenous vegetation in disturbed areas.
   - Relocate indigenous fauna to the nearest natural area.

2. **IMPACT: Construction activities and vehicles impact on the occurrence and spread of alien plant species**
   The proposed project may increase the existing occurrence of invasive alien plants on site as a result of soil disturbance for foundations for the chicken houses. It may also be caused by the introduction of alien seeds associated with the movement of vehicles and materials during the construction phase. The construction activities are unlikely to result in spread of the larger alien plant species such as bluegums and prickly pear. Given the context of the project in a residential area, the existing transformed nature of the site, the existing chicken facility and the small footprint of excavations, the predicted impact of construction of additional chicken houses in increasing occurrence of alien plants is predicted to be of Low significance.

MANAGEMENT ACTIONS:

Minimize the introduction and spread of existing invasive alien species during construction. Remove alien invasive species as per Alien and Invasive Species Regulations published in the Government Gazette No. 37886, 1 August 2014

- Ensure that the prickly pear(an aggressive species) does not re-establish from remnants of the plant by carefully removing anf burning with no remnants remaining.

3. **IMPACT: Dust and erosion caused by construction activities on ecosystem on the site**

Construction activities are likely to increase bare ground, dust and the land's susceptibility to erosion. Taking into consideration that the size of the property and the development footprint of the project is small, furthermore, the area is relatively flat, the impact of construction vehicles, and digging of the ground on the immediate environment is predicted to be of Medium significance.

MANAGEMENT ACTIONS:

Minimize dust and erosion by implementing effective measures, such as limiting the number of vehicles, people and materials to the construction site.

- Limit the number of vehicles on site, and keep within designated areas.
- Re-vegetate areas that will not be developed.
- Implement dust control measures such as adding mulch, and/ or periodically wetting the bare ground.

4. **IMPACT: Sensory disturbance as a result of construction activities (incl. moving vehicles) on fauna**

The increase in noise and light pollution at night will be a sensory disturbance and may result in fauna such as rodents vacating the area, at least temporarily during construction phase. The property has a low diversity and a small number of fauna. Furthermore, the fauna that can be found on site are generally found within urban environments and therefore associated with human activities and disturbances. The impact of construction activities on the fauna communities is predicted to be of Medium significance.

MANAGEMENT ACTIONS:

Reduce the duration of construction activities, reducing noise and light pollution that cause sensory disturbance on fauna.

- Construction can commence in winter in order to reduce the risk of disturbing active, and possibly breeding, faunal species (including migratory species).
- Limit construction activities to day time hours.
- Minimize or eliminate security and construction lights in order to reduce disturbance of any nocturnal fauna.

Operations phase:

1. **IMPACT: Sensory disturbance on the fauna as a result of noise, lights and dust from the chicken houses**

   The fauna in the study site are accustomed to noticeable levels of noise, light and dust, and are likely to only be impacted during operation of the project. Taking into consideration that the development foot print will occupy most of the property, and that there will be a small number of flora and fauna remaining on site after construction, the impact of noise, lights and dust from the chicken facility on the remaining ecosystem is predicted to be of Medium significance.

   MANAGEMENT ACTIONS:

   Minimize sensory disturbance of fauna by preventing unnecessary light and noise pollution, especially on nocturnal animals.

   - Reduce the essential lighting by ensuring that all outdoor lights are fitted with caps or that they are angled downwards
   - Ensure that Ultraviolet filtered lights are installed so that warmer, long-wavelength light is emitted to reduce insect attraction.
   - Ensure that the machinery and ventilation systems emit a low noise.

2. **IMPACT: Environmental contamination as a result of handling of chicken waste**

   Various contaminants are present in chicken waste that include nutrients, pathogens, veterinary pharmaceuticals (such as antibiotics), and naturally excreted hormones. Improper management and disposal of carcasses as well as access fodder, chemicals such as pesticides and any other operational waste may cause contamination of the local soils. Taking into consideration that the chicken facility will implement the recommended protocol to handle chicken waste and chemicals, the impact of contaminants on the surrounding environment is predicted to be of Medium significance.

   MANAGEMENT ACTIONS:

   Environmental contamination can be avoided by ensuring that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment. Furthermore, that there is appropriate control measures in place for any contamination event.

   - Ensure that the facility is designed in accordance with international best practice norms and standards, and with advice from an appropriate engineering specialist, to ensure that there is no environmental contamination from effluent, fodder, carcasses and other waste.
   - Adhere to best practice chicken husbandry and waste disposal norms as outlined in the National Environmental Management Waste Act (NEM:WA)(Act 59 of 2008).
   - Ensure that all waste (including hazardous waste) should be disposed of at an appropriate licensed facility.

- Establish appropriate emergency procedures for accidental contamination of the surrounding environment. Rehabilitate contaminated areas as soon as possible in accordance with advice from appropriate contamination and environmental specialists.
- Designate a secure and access restricted room for storage of potentially hazardous substances, with appropriate and clear signage.
- Ensure that workers are educated with regards to the handling of hazardous substances and other waste management including emergency procedures.

3. **IMPACT: Animal pests as a result of inappropriate handling of chicken waste and poor hygiene conditions in handling the chickens leading to increased breeding of animal pest.**
Sub-standard animal husbandry, poor hygiene and improper waste generation in the form of chicken excrement and excess fodder could facilitate the increased breeding of invertebrate pests such as flies, weevils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc. Poor waste management and hygiene practices may also attract vertebrate pests including rodents, mammalian carnivores and birds. Proliferation of alien pest species could adversely affect indigenous fauna in terms of competition, predation and disease transmission, and inappropriate poisoning of pests could affect non-target predatory and scavenging animals. Taking into consideration that the chicken facility will implement the recommended protocol on handling waste and pest control, the impact of diseases on the remaining fauna is predicted to be of Medium significance.

MANAGEMENT ACTIONS:
Ensure that effective pest control that does not affect non-target animals by controlling access and proliferation of pests as far as possible.

- Ensure that the chicken houses have sufficient ventilation to keep floors, bedding and fodder as dry as possible and clean floors regularly and prevent unwanted animal access to the fodder.
- Ensure that the areas surrounding the chicken facility is free of spilled manure and litter. Inspect and clear litter and waste from the site.
- Keep weeds and grass mowed to 5 cm or less in the immediate surrounding outside the facilities to reduce prevalence if insects.
- Ensure effective sanitation and rodent proofing and humane extermination of rodents
- Make use of appropriate devices and traps to kill flies, such as sticky tapes, baited traps, and use natural alternatives for pest control, rather than chemicals.
- Ensure that pest control measures are restricted to problematic areas, and ensure these measures are taxon-specific, in order to avoid unnecessary extermination of non-pest fauna.

4. **IMPACT: Diseases as a result of poor chicken waste management and/or prevalence of pests leading to a change in population of native fauna**

   Diseases could be transmitted either directly from chickens and their excrement, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of native fauna in the surrounding area. Taking into consideration that the chicken facility will implement the recommended protocol on handling waste and pest control the impact of diseases on the remaining fauna is predicted to be of Medium significance.

   MANAGEMENT ACTIONS:

   Avoid transmission of diseases to remaining fauna.

   - Ensure that excrement, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment.
   - Ensure that there are appropriate control measures in place for any contamination event.
   - Control the access and proliferation of pests as far as possible.

Decommissioning phase:

1. **Impact of decommissioning and removal of facilities on fauna and flora on site**

   The decommissioning of the site will need to be done according to the legislated requirements at the time. At this stage, the end use of the site after the chicken farming is unknown. Decommissioning could lead to increased dust and potential erosion if land is left bare, and could lead to temporary sensory disturbance of fauna. If the natural vegetation was re-established after the chicken farming has ceased, this could have a positive impact on the ecology of the site in the form of rehabilitation through leveling the ground, adding top soil and planting indigenous vegetation to re-establish the floral communities and to stabilize and prevent erosion. However, it is recognised that the site is located in a small holdings. Taking into consideration that decommissioning activities will occur within a built up surrounding area, and the small number of fauna that will still be remaining on site, the impact of removing the chicken facility on the immediate and surrounding environment is predicted to be of Medium significance.

   MANAGEMENT ACTIONS:

   Promote the re-establishment of indigenous vegetation in disturbed areas and minimize introduction and spread of invasive alien vegetation.

   - Plant only locally indigenous flora if landscaping is required.

Table 11: Impact assessment of predicted impacts during the Construction Phase

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance		Status	Ranking of Impact	Confidence
								Without Mitigation	*With Mitigation*			
Impact of project footprint on transformed vegetation and faunal habitat												
From clearing of vegetation, increased vehicle activity, altered burning and proliferation of alien flora	Avoid unnecessary loss of vegetation and faunal habitats; relocate indigenous fauna to natural areas in the neighbouring vicinity; promote re-establishment of indigenous vegetation in disturbed areas	Local (<2km)	Low	Long Term	High	Low	Probable	Medium	Low	Negative	5	High
Impact of construction activities (including movement of vehicles) on occurrence and spread of alien plant species												
The proposed project may increase the existing occurrence alien grasses and herbaceous plants on site as a result of soil disturbance for foundations for the chicken houses, as well as the introduction of	Minimize the introduction and proliferation of invasive alien species during construction by limiting and regulating access by potential vectors of alien flora and maintaining a tidy construction site	Local	Low	Temporary	High	Low	Probable	Low	Low	Negative	3	High

alien seed with the movement of vehicles and materials												
Impact of dust and erosion caused by construction activities on ecology on the site												
Construction activities are likely to increase bare ground, dust and the land's susceptibility to erosion	Minimise dust and erosion by implementing effective measures to control dust erosion, such as limiting vehicles, people and materials to the construction site.	Local	Low	Temporary	High	Low	Probable	Medium	Low	Negative	3	High
Impact of sensory disturbance as a result of construction activities (incl. vehicles) on fauna												
The increase in noise and light pollution will be a sensory disturbance and may result in fauna such as rodents vacating the area, at least temporarily during construction phase**.**	Sensory disturbance can be minimized by reducing the duration of construction activities, reducing noise and light pollution that cause sensory disturbance on fauna.	Local	Low	Temporary	High	Low	Probable	Medium	Low	Negative	4	High

Table 12: Impact assessment of predicted impacts during the Operations Phase

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance		Status	Ranking of Impact	Confidence
								Without Mitigation	*With Mitigation*			
Impact on the fauna as a result of noise, lights and dust from the chicken houses leading to sensory disturbance												
Noise generated by the chickens, and lights turned on at night may have an impact on the fauna in the environment.	Minimise sensory disturbance of fauna by minimizing essential lighting, noise, and preventing unnecessary light and noise pollution, especially on nocturnal animals**.**	Local	Low	Long-term	High	Low	Probable	Medium	Low	Negative	3	High
Impact of contaminants as a result of handling of chicken waste on leading to contaminating the surrounding environment												
Improper management and disposal of carcasses as well as access fodder, chemicals such	Environmental contamination can be avoided by ensuring that excrement, carcasses, feed, and other	Local	Low	Long-term	High	Low	Highly Probable	Medium	Low	Negative	4	High

as pesticides and any other operational waste may cause contamination of the local soils.	operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment.											
Impact of animal pests as a result of inappropriate handling of chicken waste and poor hygiene conditions in handling the chickens leading to increased breeding of animal pest.												
Poor management of chicken excrement and excess fodder may increase breeding of invertebrate pests. Poor waste management and hygiene practices may also attract vertebrate pests. And may adversely affect the local/ indigenous fauna.	Ensure that effective pest control that also does not affect non-target animals by controlling access and proliferation of pests as far as possible.	Local	Low	Long-term	High	Low	Highly Probable	Medium	Low	Negative	5	High

Impact of diseases as a result of poor chicken waste management and/or prevalence of pests leading to a change in population of native fauna												
Diseases could be transmitted either directly from chickens and their excrement, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of native fauna in the surrounding area.	Ensure that pests and other potential vectors are unable to enter areas where they might encounter production animals, carcasses, excrement or bedding, by thoroughly sealing these areas using effective, humane and environmentally-friendly means.	Local	Low	Long-term	High	Low	Probable	Medium	Low	Negative	4	High

Table 13: Impact assessment of predicted impacts during the Decommissioning Phase

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance		Status	Ranking of Impact	Confidence
								Without Mitigation	*With Mitigation*			
Impact of decommissioning and removal of facilities on fauna and flora on site												
Decommissioning could lead to increased dust and potential erosion if land is left bare, and could lead to sensory disturbance of fauna.	Promote the re-establishment of indigenous vegetation in disturbed areas and minimize introduction and spread of invasive alien vegetation.	Local (<2km)	Low	Temporary	High	Low	Probable	Medium	Medium	Positive	4	High

8. CONCLUSIONS AND SPECIALIST OPINION

The 1.7 ha project site does not have any regionally or locally important topographical or ecological features. The site has been transformed by existing infrastructure, alien invasive vegetation, livestock grazing, indiscriminate dumping of organic waste and diggings. The following is a summary of the findings and potential implications of the proposed expansion of the chicken broiler facility by approximately 2000 m^2 on the ecology of the site and local area:

Species richness: The small size of the study site and its disturbed nature, mean that species have been displaced, resulting in low species richness.
Endangered species: No Red Data flora or fauna are expected be found on this site.
Sensitive species and/areas: The project site falls in Soweto Highveld Grassland vegetation unit, which is considered to be Endangered; and more importantly the Blesbokspruit Highvelf Grassland, which is Critically Endangered (Mucina & Rutherford, 2006).
Habitat quality and extent: The site has been transformed by fences, invasive plants, grazing of livestock, indiscriminant dumping or organic waste, diggings.
Impact on species richness and conservation: The expansion of the chicken broiler facility will have a small, permanent footprint, but will not significantly impact on the species diversity or associated ecosystems, given the current transformed nature that has altered the ecological state.
Connectivity: The proposed development will have limited fragmentation on surrounding ecosystems or habitats.
Management Recommendation: If any native fauna species are encountered or exposed during construction, depending on the species, should be removed and relocated to natural areas in the vicinity, or appoint a specialist**.** Alien and invasive plants must be removed. Re-establish indigenous vegetation in disturbed areas when the development is operational.
General opinion: From an ecological perspective, there is no objection against the proposed development, provided the mitigation measure are implemented.

The proposed projects will be developed on previously transformed grassland, but it must be noted that a chicken broiler facility is a form of farming that entails habitat change and may potentially result in secondary ecological impacts from aspects such as habitat loss from construction of facilities, chicken waste and potential diseases. The conservation status of the site is ranked as Low, meaning that the land has little conservation value and that could be considered for development with little to no impact on the floral and faunal communities. There were no sensitive ecological systems or components recognised.

Furthermore, with the implementation of the mitigation measures outlined in the report, the significance of ecological impacts on site can be reduced to Low. Based on the site visit and the information that was available to date, it is the opinion of the CSIR specialist that there are no fatal flaws to the project. If all the recommended mitigation measures are implemented, the CSIR specialist has no objection to the project going forward.

9. REFERENCES

Acocks, J. P. H. (1988): Veld types of South Africa. *Memoirs of the Botanical Survey of South Africa* 57: 1-146.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & De Villiers, M.S. 2014. Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Strelitzia 32. SANBI, Pretoria.

BirdLife South Africa, 2015. The 2015 Eskom Red Data Book of Birds or South Africa, Lesotho and Swaziland.

Bromilow, C, (2010): Problem Plants of Southern Africa. Third edition, first impression Briza Publications, Pretoria.

Council of Geosciences (CSG) 2008.Simplified Geological Map of the Republic of South Africa and the Kingdoms of Lesotho and Swaziland, CSG, Pretoria,

Council for Scientific and Industrial Research. NFEPA wetlands 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 28 February 2018.

Department of Environmental Affairs (DEA), 2009. Government Gazette No 32689, (2009): Draft National List of Threatened Ecosystems in terms of the National Environmental Management Act, 2004 (Act 10 of 2004). Department of Environmental Affairs Notice 1477 of 2009 in Government Gazette No 32689, 6 November 2009.

DEA, 2016. Alien and Invasive Species Lists (2016) NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) Department of Environmental Affairs Notice 864 of 2016 in Government Gazette No 40166, 29 July 2016.

Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill L., Swartz, E.R., Manuel, J. & Funke, N. 2011. Implementation Manual for Freshwater Ecosystem Priority Areas. Water Research Commission, Pretoria.

Edwards, D., (1983): A broad-scale structural classification of vegetation for practical purposes,*Bothalia* 14, 705–712.

Ekurhuleni Metropolitan Municipality, 2015. Ekurhuleni Metropolitan Spatial Development Framework 2015.

Friedmann, Y. & Daly, B. 2004. Red data book of the mammals of South Africa, a conservation assessment. Johannesburg, Endangered Wildlife Trust.

FrogMAP. 2018. Website: http://vmus.adu.org.za. Accessed February 2018.

Gauteng Department of Agriculture and Rural Development(GDARD), 2011: Gauteng Conservation Plan Version 3 ArcGIS Spatial data

GDARD, 2014. GDARD Requirements for Biodiversity Assessments Version 2. GDARD, Johannesburg.

Henderson, L., (2001): Alien Weeds and Invasive Plants. A complete guide to declared weeds and invaders in South Africa. Plant Protection Research Institute Handbook No. 12. Agricultural Research Council, South Africa.

IUCN. 2017. The IUCN Red List of Threatened Species. Website: www.iucnredlist.org. Accessed in February 2018.

Leeming J. 2003. Scorpions of Southern Africa. Struik Publishers, Cape Town.

LepiMAP. 2017. Website: http://vmus.adu.org.za. Accessed in February 2018.

Low, A.B. & Rebelo, A.G. (1996): Vegetation of South. Africa, Lesotho and Swaziland. Pretoria. Department of Environmental Affairs and Tourism, South Africa

MammalMAP. 2017. Website: http://vmus.adu.org.za. Accessed in February 2018.

Manning, J., (2009): Field Guide to Wild Flowers of South Africa. Random House Struik (Pty) Ltd.

Mecenero, S., J.B. Ball, D.A. Edge, M.L. Hamer, G.A. Hening, M. Krüger, E.L. Pringle, R.F. Terblanche & M.C. Williams (eds). 2013. Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas. Saftronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.

Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.

Mucina L. & Rutherford M.C. 2006. The Vegetation Map of South Africa, Lesotho and Swaziland. Strelitzia 19, SANBI, Pretoria.

OdonataMAP. 2018. Website: http://vmus.adu.org.za. Accessed in February 2018.

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama P.A., (eds) (2009): Red List of South African plants 2009. *Strelitzea* 25, South African National Biodiversity Institute.

Ramsar, 2015. Website: https://www.ramsar.org/. Accessed February 2018.

ReptileMAP. 2018. Website: http://vmus.adu.org.za. Accessed in February 2018.

SABAP 2 (SECOND SOUTHERN AFRICAN BIRD ATLAS PROJECT). 2018. Website: http://sabap2.adu.org.za. Accessed in February 2018/

Samways, M.J., 2006: National Red List of South African dragonflies (Odonata). Odonatologica, 35: 341–368.

SANBI, (2009): Plants of Southern Africa. POSA version 3. June 2009. Website:http://posa.sanbi.org. Accessed February 2018

SANBI 2016.Botanical Database of Southern Africa (BODATSA). Website: http://newposa.sanbi.org. Accessed February 2018.

Tainton N. (1999): Veld Management in South Africa. University of Natal Press, Pietermaritzburg

Taylor, M.R., Peacock, F. & Wanless, R.M. (eds). 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Johannesburg: BirdLife South Africa.

TOPS (Threatened or Protected Species List). 2007. National Environmental Management: Biodiversity Act, 2004 (Act No. 10, 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species. February 2007.

Van Oudtshoorn, F., (2002): A Guide to Grasses of Southern Africa. Briza Publications,

Van Wyk, B., Van Oudshoorn B., & Gericke N., (2005): Medicinal Plant of South Africa. Briza Publications, Pretoria

World Weather Online, 2018. Website: https://www.worldweatheronline.com/. Accessed February 2018.

South African National Biodiversity Institute(SANBI). 2012 Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2012.

SANBI, 2011. National Biodiversity Assessment: Terrestrial Ecosystem Threat Status [vector geospatial dataset]2012.

SANBI & DEAT, 2009. Threatened Ecosystems in South Africa: Descriptions and Maps.

APPENDIX 1: Plant species recorded in QDS 2628AB. Data source: POSA, 2017.

Family	Species	Threat status	Growth forms
ACANTHACEAE	*Blepharis stainbankiae C.B.Clarke*	LC	Herb
ACANTHACEAE	*Crabbea acaulis N.E.Br.*	LC	Herb
ACANTHACEAE	*Justicia anagalloides (Nees) T.Anderson*	LC	Herb
ACANTHACEAE	*Thunbergia natalensis Hook.*	LC	Dwarf shrub, herb
ALLIACEAE	*Tulbaghia acutiloba Harv.*	LC	Herb
ALLIACEAE	*Tulbaghia leucantha Baker*	LC	Herb
AMARANTHACEAE	*Achyranthes aspera L. var. aspera*	Not Evaluated	Herb
AMARYLLIDACEAE	*Crinum bulbispermum (Burm.f.) Milne-Redh. & Schweick.*	Declining	Geophyte, hydrophyte
AMARYLLIDACEAE	*Crinum graminicola I.Verd.*	LC	Geophyte
AMARYLLIDACEAE	*Cyrtanthus breviflorus Harv.*	LC	Geophyte
ANACARDIACEAE	*Searsia discolor (E.Mey. ex Sond.) Moffett*	LC	Dwarf shrub, shrub
ANACARDIACEAE	*Searsia pyroides (Burch.) Moffett var. pyroides*	LC	[No lifeform defined]
ANEMIACEAE	*Mohria vestita Baker*	LC	Geophyte, herb, lithophyte
ANTHERICACEAE	*Chlorophytum cooperi (Baker) Nordal*	LC	Herb
ANTHERICACEAE	*Chlorophytum fasciculatum (Baker) Kativu*	LC	Herb
ANTHERICACEAE	*Chlorophytum transvaalense (Baker) Kativu*	LC	Herb
APIACEAE	*Afrosciadium magalismontanum (Sond.) P.J.D.Winter*	LC	Herb
APIACEAE	*Alepidea peduncularis A.Rich.*	DDT	Herb
APIACEAE	*Centella asiatica (L.) Urb.*	LC	Climber, herb
APOCYNACEAE	*Asclepias albens (E.Mey.) Schltr.*	LC	Herb
APOCYNACEAE	*Asclepias aurea (Schltr.) Schltr.*	LC	Herb
APOCYNACEAE	*Asclepias eminens (Harv.) Schltr.*	LC	Herb
APOCYNACEAE	*Asclepias stellifera Schltr.*	LC	Herb
APOCYNACEAE	*Aspidoglossum interruptum (E.Mey.) Bullock*	LC	Herb, succulent
APOCYNACEAE	*Aspidoglossum lamellatum (Schltr.) Kupicha*	LC	Herb, succulent
APOCYNACEAE	*Aspidoglossum restioides (Schltr.) Kupicha*	LC	Herb, succulent
APOCYNACEAE	*Cordylogyne globosa E.Mey.*	LC	Geophyte, succulent
APOCYNACEAE	*Pachycarpus schinzianus (Schltr.) N.E.Br.*	LC	Herb, succulent
APOCYNACEAE	*Pachycarpus suaveolens (Schltr.) Nicholas & Goyder*	VU	Herb, succulent
APOCYNACEAE	*Raphionacme hirsuta (E.Mey.) R.A.Dyer*	LC	Geophyte, herb, succulent
APOCYNACEAE	*Xysmalobium brownianum S.Moore*	LC	Herb, succulent
APONOGETONACEAE	*Aponogeton junceus Lehm.*	LC	Geophyte, herb, hydrophyte
ASPHODELACEAE	*Bulbine abyssinica A.Rich.*	LC	Geophyte, herb, succulent
ASPHODELACEAE	*Bulbine favosa (Thunb.) Schult. & Schult.f*	LC	Geophyte, herb, succulent
ASPHODELACEAE	*Bulbine narcissifolia Salm-Dyck*	LC	Geophyte, herb, succulent
ASPHODELACEAE	*Chortolirion angolense (Baker) A.Berger*	LC	Geophyte, succulent
ASPHODELACEAE	*Kniphofia porphyrantha Baker*	LC	Herb
ASPHODELACEAE	*Kniphofia typhoides Codd*	NT	Herb, succulent
ASPHODELACEAE	*Trachyandra asperata Kunth var. macowanii (Baker) Oberm.*	LC	Geophyte, succulent
ASPHODELACEAE	*Trachyandra saltii (Baker) Oberm. var. saltii*	LC	Geophyte, succulent

Family	Species	Threat status	Growth forms
ASPLENIACEAE	*Asplenium adiantum-nigrum L. var. adiantum-nigrum*	LC	Geophyte, herb, lithophyte
ASTERACEAE	*Acanthospermum glabratum (DC.) Wild*	Not Evaluated	Herb
ASTERACEAE	*Arctotis arctotoides (L.f.) O.Hoffm.*	LC	Herb
ASTERACEAE	*Aster harveyanus Kuntze*	LC	Herb
ASTERACEAE	*Aster peglerae Bolus*	LC	Herb
ASTERACEAE	*Athrixia elata Sond.*	LC	Dwarf shrub
ASTERACEAE	*Berkheya insignis (Harv.) Thell.*	LC	Herb
ASTERACEAE	*Berkheya radula (Harv.) De Wild.*	LC	Herb
ASTERACEAE	*Berkheya setifera DC.*	LC	Herb
ASTERACEAE	*Berkheya zeyheri Oliv. & Hiern subsp. zeyheri*	LC	Herb
ASTERACEAE	*Conyza podocephala DC.*	LC	Herb
ASTERACEAE	*Cotula coronopifolia L.*	LC	Helophyte, herb
ASTERACEAE	*Crepis hypochaeridea (DC.) Thell.*	Not Evaluated	Herb
ASTERACEAE	*Denekia capensis Thunb.*	LC	Herb
ASTERACEAE	*Dicoma anomala Sond. subsp. anomala*	LC	Herb
ASTERACEAE	*Dimorphotheca caulescens Harv.*	LC	Herb
ASTERACEAE	*Dimorphotheca spectabilis Schltr.*	LC	Herb
ASTERACEAE	*Felicia muricata (Thunb.) Nees subsp. muricata*	LC	Shrub
ASTERACEAE	*Gazania krebsiana Less. subsp. serrulata (DC.) Roessler*	LC	Herb
ASTERACEAE	*Gerbera piloselloides (L.) Cass.*	LC	Herb
ASTERACEAE	*Gnaphalium confine Harv.*	LC	Herb
ASTERACEAE	*Gnaphalium filagopsis Hilliard & B.L.Burtt*	LC	Herb
ASTERACEAE	*Haplocarpha scaposa Harv.*	LC	Herb
ASTERACEAE	*Helichrysum argyrosphaerum DC.*	LC	Herb
ASTERACEAE	*Helichrysum aureonitens Sch.Bip.*	LC	Herb
ASTERACEAE	*Helichrysum caespititium (DC.) Harv.*	LC	Herb
ASTERACEAE	*Helichrysum callicomum Harv.*	LC	Herb
ASTERACEAE	*Helichrysum lepidissimum S.Moore*	LC	Herb, shrub
ASTERACEAE	*Helichrysum nudifolium (L.) Less. var. nudifolium*	LC	Herb
ASTERACEAE	*Helichrysum rugulosum Less.*	LC	Herb
ASTERACEAE	*Helichrysum setosum Harv.*	LC	Herb, shrub
ASTERACEAE	*Helichrysum stenopterum DC.*	LC	Herb
ASTERACEAE	*Hilliardiella hirsuta (DC.) H.Rob.*	LC	Herb
ASTERACEAE	*Lactuca inermis Forssk.*	LC	Herb
ASTERACEAE	*Launaea rarifolia (Oliv. & Hiern) Boulos var. rarifolia*	LC	Herb
ASTERACEAE	*Nidorella anomala Steetz*	LC	Herb
ASTERACEAE	*Nidorella hottentotica DC.*	LC	Herb
ASTERACEAE	*Nolletia rarifolia (Turcz.) Steetz*	LC	Suffrutex
ASTERACEAE	*Oncosiphon piluliferum (L.f.) Källersjö*	LC	Herb
ASTERACEAE	*Phymaspermum athanasioides (S.Moore) Källersjö*	LC	Shrub
ASTERACEAE	*Pseudognaphalium luteo-album (L.) Hilliard & B.L.Burtt*		Herb

Family	Species	Threat status	Growth forms
ASTERACEAE	*Schistostephium crataegifolium (DC.) Fenzl ex Harv.*	LC	Herb, suffrutex
ASTERACEAE	*Senecio coronatus (Thunb.) Harv.*	LC	Herb
ASTERACEAE	*Senecio erubescens Aiton var. erubescens*	LC	Herb
ASTERACEAE	*Senecio isatideus DC.*	LC	Herb
ASTERACEAE	*Senecio laevigatus Thunb. var. laevigatus*	LC	Herb
ASTERACEAE	*Senecio lydenburgensis Hutch. & Burtt Davy*	LC	Herb
ASTERACEAE	*Senecio othonniflorus DC.*	LC	Herb
ASTERACEAE	*Senecio oxyriifolius DC. subsp. oxyriifolius*	LC	Herb, succulent
ASTERACEAE	*Senecio venosus Harv.*	LC	Herb
ASTERACEAE	*Sonchus nanus Sond. ex Harv.*	LC	Herb
ASTERACEAE	*Tagetes minuta L.*	Not Evaluated	Herb
ASTERACEAE	*Tolpis capensis (L.) Sch.Bip.*	LC	Herb
ASTERACEAE	*Tripteris aghillana DC. var. aghillana*	LC	Herb, succulent
ASTERACEAE	*Ursinia nana DC. subsp. leptophylla Prassler*	LC	Herb
ASTERACEAE	*Vernonia galpinii Klatt*	LC	Herb
BORAGINACEAE	*Buglossoides arvensis (L.) I.M.Johnst.*	Not Evaluated	Herb
BORAGINACEAE	*Cynoglossum lanceolatum Forssk.*	LC	Herb
BORAGINACEAE	*Lithospermum cinereum A.DC.*	LC	Herb
BRASSICACEAE	*Descurainia sophia (L.) Webb ex Prantl*	Not Evaluated	Herb
BRASSICACEAE	*Lepidium bonariense L.*	Not Evaluated	Herb
BRUCHIACEAE	*Cladophascum gymnomitrioides (Dixon) Dixon*		Bryophyte
CAPPARACEAE	*Cleome monophylla L.*	LC	Herb
CARYOPHYLLACEAE	*Cerastium capense Sond.*	LC	Herb
CARYOPHYLLACEAE	*Corrigiola litoralis L. subsp. litoralis var. litoralis*	LC	Herb
CARYOPHYLLACEAE	*Dianthus mooiensis F.N.Williams subsp. kirkii (Burtt Davy) S.S.Hooper*	Not Evaluated	Herb
CARYOPHYLLACEAE	*Pollichia campestris Aiton*	LC	Herb
CARYOPHYLLACEAE	*Silene gallica L.*	Not Evaluated	Herb
CHENOPODIACEAE	*Atriplex suberecta I.Verd.*	LC	Herb
CHENOPODIACEAE	*Chenopodium phillipsianum Aellen*	Not Evaluated	Herb
CHRYSOBALANACEAE	*Parinari capensis Harv. subsp. capensis*	LC	Dwarf shrub
COLCHICACEAE	*Colchicum striatum (Hochst. ex A.Rich.) J.C.Manning & Vinn.*	LC	Geophyte
COMMELINACEAE	*Commelina africana L. var. krebsiana (Kunth) C.B.Clarke*	LC	Herb
COMMELINACEAE	*Commelina africana L. var. lancispatha C.B.Clarke*	LC	Herb
COMMELINACEAE	*Commelina livingstonii C.B.Clarke*	LC	Herb
COMMELINACEAE	*Commelina subulata Roth*	LC	Helophyte, herb
COMMELINACEAE	*Cyanotis speciosa (L.f.) Hassk.*	LC	Herb, succulent
CONVOLVULACEAE	*Convolvulus farinosus L.*	LC	Climber, herb
CONVOLVULACEAE	*Cuscuta australis R.Br.*	LC	Herb, parasite
CONVOLVULACEAE	*Cuscuta campestris Yunck.*	Not Evaluated	Herb, parasite

Family	Species	Threat status	Growth forms
CONVOLVULACEAE	*Falkia oblonga Bernh. ex C.Krauss*	LC	Herb
CONVOLVULACEAE	*Ipomoea bathycolpos Hallier f.*	LC	Herb
CONVOLVULACEAE	*Ipomoea crassipes Hook. var. crassipes*	LC	Herb, succulent
CONVOLVULACEAE	*Ipomoea obscura (L.) Ker Gawl. var. obscura*	LC	Herb
CONVOLVULACEAE	*Ipomoea oenotherae (Vatke) Hallier f. var. oenotherae*	LC	Herb
CONVOLVULACEAE	*Ipomoea ommanneyi Rendle*	LC	Herb, succulent
CONVOLVULACEAE	*Ipomoea simplex Thunb.*	LC	Herb, succulent
CONVOLVULACEAE	*Merremia verecunda Rendle*	LC	Herb
CRASSULACEAE	*Cotyledon orbiculata L. var. oblonga (Haw.) DC.*	LC	Dwarf shrub, succulent
CRASSULACEAE	*Crassula lanceolata (Eckl. & Zeyh.) Endl. ex Walp. subsp. lanceolata*	LC	Herb, succulent
CRASSULACEAE	*Crassula natans Thunb. var. natans*	LC	Hydrophyte, succulent
CRASSULACEAE	*Crassula setulosa Harv. var. setulosa forma setulosa*	Not Evaluated	Herb, succulent
CYPERACEAE	*Abildgaardia ovata (Burm.f.) Kral*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Bulbostylis burchellii (Ficalho & Hiern) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Bulbostylis oritrephes (Ridl.) C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Bulbostylis scleropus C.B.Clarke*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Carex glomerabilis V.I.Krecz.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus congestus Vahl*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus difformis L.*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Cyperus esculentus L. var. esculentus*	LC	Cyperoid, geophyte, herb, mesophyte
CYPERACEAE	*Cyperus fastigiatus Rottb.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus longus L. var. tenuiflorus (Rottb.) Boeck.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus marginatus Thunb.*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Cyperus obtusiflorus Vahl var. flavissimus (Schrad.) Boeck.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus obtusiflorus Vahl var. obtusiflorus*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus rigidifolius Steud.*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Cyperus semitrifidus Schrad.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus uitenhagensis (Steud.) C.Archer & Goetgh.*	LC	Cyperoid, herb, mesophyte
CYPERACEAE	*Cyperus usitatus Burch.*	LC	Cyperoid, geophyte, herb, mesophyte
CYPERACEAE	*Fimbristylis complanata (Retz.) Link*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Fuirena pubescens (Poir.) Kunth var. pubescens*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Isolepis fluitans (L.) R.Br. var. fluitans*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Kyllinga alata Nees*	LC	Cyperoid, helophyte, herb, mesophyte
CYPERACEAE	*Kyllinga erecta Schumach. var. erecta*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Kyllinga melanosperma Nees*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Kyllinga pulchella Kunth*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Pycreus macranthus (Boeckeler) C.B.Clarke*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Schoenoplectus decipiens (Nees) J.Raynal*	LC	Cyperoid, helophyte, herb
CYPERACEAE	*Schoenoplectus lateriflorus (J.F.Gmel.) Lye*		Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Schoenoplectus muricinux (C.B.Clarke) J.Raynal*	LC	Cyperoid, emergent hydrophyte, helophyte, herb

Family	Species	Threat status	Growth forms
CYPERACEAE	*Schoenoplectus muriculatus (Kük.) Browning*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Schoenoplectus pulchellus (Kunth) J.Raynal*	LC	Cyperoid, emergent hydrophyte, helophyte, herb
CYPERACEAE	*Scirpoides burkei (C.B.Clarke) Goetgh., Muasya & D.A.Simpson*	LC	Cyperoid, herb, mesophyte
DIPSACACEAE	*Cephalaria zeyheriana Szabó*	LC	Herb
DIPSACACEAE	*Scabiosa columbaria L.*	LC	Herb
EBENACEAE	*Diospyros lycioides Desf. subsp. guerkei (Kuntze) De Winter*	LC	Shrub, tree
ELATINACEAE	*Bergia decumbens Planch. ex Harv.*	LC	Dwarf shrub
ERIOSPERMACEAE	*Eriospermum flagelliforme (Baker) J.C.Manning*	LC	Geophyte
EUPHORBIACEAE	*Acalypha angustata Sond.*	LC	Dwarf shrub, herb
EUPHORBIACEAE	*Acalypha caperonioides Baill. var. caperonioides*	DDT	Dwarf shrub, herb
EUPHORBIACEAE	*Euphorbia prostrata Aiton*	Not Evaluated	Herb
EUPHORBIACEAE	*Euphorbia striata Thunb. var. striata*	LC	Dwarf shrub, herb
EXORMOTHECACEAE	*Exormotheca holstii Steph.*		Bryophyte
FABACEAE	*Acacia baileyana F.Muell.*	Not Evaluated	Shrub, tree
FABACEAE	*Acacia dealbata Link*	Not Evaluated	Shrub, tree
FABACEAE	*Argyrolobium speciosum Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Chamaecrista biensis (Steyaert) Lock*	LC	Herb
FABACEAE	*Crotalaria globifera E.Mey.*	LC	Herb, shrub
FABACEAE	*Dichilus gracilis Eckl. & Zeyh.*	LC	Dwarf shrub, herb
FABACEAE	*Dichilus lebeckioides DC.*	LC	Dwarf shrub, herb
FABACEAE	*Dichilus strictus E.Mey.*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Dolichos angustifolius Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Elephantorrhiza elephantina (Burch.) Skeels*	LC	Dwarf shrub, shrub, suffrutex
FABACEAE	*Eriosema burkei Benth. ex Harv. var. burkei*	LC	Herb
FABACEAE	*Eriosema nutans Schinz*	LC	Dwarf shrub, herb
FABACEAE	*Eriosema salignum E.Mey.*	LC	Herb
FABACEAE	*Erythrina zeyheri Harv.*	LC	Dwarf shrub, shrub, succulent
FABACEAE	*Indigastrum burkeanum (Benth. ex Harv.) Schrire*	LC	Herb
FABACEAE	*Indigofera confusa Prain & Baker f.*	LC	Herb
FABACEAE	*Indigofera hybrida N.E.Br.*	VU	Herb
FABACEAE	*Indigofera oxytropis Benth. ex Harv.*	LC	Herb
FABACEAE	*Indigofera zeyheri Spreng. ex Eckl. & Zeyh.*	LC	Dwarf shrub, herb
FABACEAE	*Lessertia affinis Burtt Davy*	LC	Herb
FABACEAE	*Lessertia prostata DC.*	LC	Herb
FABACEAE	*Lotononis laxa Eckl. & Zeyh.*	LC	Herb
FABACEAE	*Melolobium wilmsii Harms*	LC	Dwarf shrub
FABACEAE	*Pearsonia cajanifolia (Harv.) Polhill subsp. cajanifolia*	LC	Herb, shrub
FABACEAE	*Pearsonia sessilifolia (Harv.) Dummer subsp. sessilifolia*	LC	Dwarf shrub, herb
FABACEAE	*Rhynchosia adenodes Eckl. & Zeyh.*	LC	Herb

Family	Species	Threat status	Growth forms
FABACEAE	*Rhynchosia nervosa Benth. ex Harv. var. nervosa*	LC	Herb
FABACEAE	*Rhynchosia totta (Thunb.) DC. var. totta*	LC	Climber, herb
FABACEAE	*Sutherlandia microphylla Burch. ex DC.*	LC	Shrub
FABACEAE	*Tephrosia capensis (Jacq.) Pers. var. capensis*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Tephrosia elongata E.Mey. var. elongata*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Tephrosia longipes Meisn. subsp. longipes var. longipes*	LC	Dwarf shrub, herb, shrub
FABACEAE	*Trifolium africanum Ser. var. africanum*	LC	Herb
FABACEAE	*Trifolium africanum Ser. var. lydenburgense J.B.Gillett*	LC	Herb
FABACEAE	*Vicia sativa L. subsp. sativa*	Not Evaluated	Climber, herb
FABACEAE	*Vigna unguiculata (L.) Walp. subsp. stenophylla (Harv.) Maréchal, Mascherpa & Stainier*	LC	Climber, herb
FABACEAE	*Zornia capensis Pers. subsp. capensis*	LC	Herb
FABACEAE	*Zornia linearis E.Mey.*	LC	Herb
FABACEAE	*Zornia milneana Mohlenbr.*	LC	Herb
GENTIANACEAE	*Chironia palustris Burch. subsp. palustris*	LC	Herb
GENTIANACEAE	*Chironia purpurascens (E.Mey.) Benth. & Hook.f. subsp. humilis (Gilg) I.Verd.*	LC	Herb
GENTIANACEAE	*Sebaea exigua (Oliv.) Schinz*	LC	Herb
GENTIANACEAE	*Sebaea leiostyla Gilg*	LC	Herb
GERANIACEAE	*Monsonia angustifolia E.Mey. ex A.Rich.*	LC	Herb
GERANIACEAE	*Pelargonium luridum (Andrews) Sweet*	LC	Geophyte, succulent
GERANIACEAE	*Pelargonium pseudofumarioides R.Knuth*	LC	Herb, scrambler
GERANIACEAE	*Pelargonium sidoides DC.*	LC	Dwarf shrub, geophyte
HYACINTHACEAE	*Albuca shawii Baker*	LC	Geophyte
HYACINTHACEAE	*Dipcadi marlothii Engl.*	LC	Geophyte
HYACINTHACEAE	*Dipcadi viride (L.) Moench*	LC	Geophyte
HYACINTHACEAE	*Drimia depressa (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Drimia elata Jacq.*	DDT	Geophyte
HYACINTHACEAE	*Drimia multisetosa (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Eucomis autumnalis (Mill.) Chitt. subsp. clavata (Baker) Reyneke*	Not Evaluated	Geophyte
HYACINTHACEAE	*Ledebouria marginata (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ledebouria ovatifolia (Baker) Jessop*	LC	Geophyte
HYACINTHACEAE	*Ornithogalum flexuosum (Thunb.) U.& D.Müll.-Doblies*	LC	Geophyte
HYACINTHACEAE	*Ornithogalum tenuifolium F.Delaroche subsp. tenuifolium*	Not Evaluated	Geophyte
HYDROCHARITACEAE	*Lagarosiphon muscoides Harv.*	LC	Herb, hydrophyte
HYPERICACEAE	*Hypericum aethiopicum Thunb. subsp. sonderi (Bredell) N.Robson*	LC	Herb
HYPERICACEAE	*Hypericum lalandii Choisy*	LC	Herb
HYPOXIDACEAE	*Hypoxis filiformis Baker*	LC	Geophyte
HYPOXIDACEAE	*Hypoxis iridifolia Baker*	LC	Geophyte
HYPOXIDACEAE	*Hypoxis rigidula Baker var. rigidula*	LC	Geophyte, herb

Family	Species	Threat status	Growth forms
IRIDACEAE	*Aristea torulosa Klatt*	LC	Herb
IRIDACEAE	*Babiana bainesii Baker*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus crassifolius Baker*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus dalenii Van Geel subsp. dalenii*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus permeabilis D.Delaroche subsp. edulis (Burch. ex Ker Gawl.) Oberm.*	LC	Geophyte, herb
IRIDACEAE	*Gladiolus robertsoniae F.Bolus*	NT	Geophyte, herb
IRIDACEAE	*Hesperantha coccinea (Backh. & Harv.) Goldblatt & J.C.Manning*	LC	Geophyte, herb
IRIDACEAE	*Hesperantha longicollis Baker*	LC	Geophyte, herb
IRIDACEAE	*Moraea pallida (Baker) Goldblatt*	LC	Geophyte, herb
IRIDACEAE	*Moraea simulans Baker*	LC	Geophyte, herb
IRIDACEAE	*Moraea stricta Baker*	LC	Geophyte, herb
IRIDACEAE	*Tritonia nelsonii Baker*	LC	Geophyte, herb
JUNCACEAE	*Juncus lomatophyllus Spreng.*	LC	Herb, hydrophyte, hyperhydate
JUNCACEAE	*Juncus oxycarpus E.Mey. ex Kunth*	LC	Helophyte, herb
LAMIACEAE	*Leucas martinicensis (Jacq.) R.Br.*	LC	Herb
LAMIACEAE	*Ocimum obovatum E.Mey. ex Benth. subsp. obovatum var. obovatum*	LC	Herb
LAMIACEAE	*Rotheca hirsuta (Hochst.) R.Fern.*	LC	Herb
LAMIACEAE	*Salvia repens Burch. ex Benth. var. transvaalensis Hedge*	LC	Herb
LAMIACEAE	*Salvia stenophylla Burch. ex Benth.*		Herb
LAMIACEAE	*Syncolostemon pretoriae (Gürke) D.F.Otieno*	LC	Herb
LAMIACEAE	*Teucrium trifidum Retz.*	LC	Herb
LENTIBULARIACEAE	*Utricularia stellaris L.f.*	LC	Carnivore, herb, pleustophyte
LINACEAE	*Linum thunbergii Eckl. & Zeyh.*	LC	Herb
LOBELIACEAE	*Lobelia erinus L.*	LC	Herb
LOBELIACEAE	*Lobelia flaccida (C.Presl) A.DC. subsp. flaccida*	LC	Herb
LYTHRACEAE	*Ammannia baccifera L. subsp. baccifera*	Not Evaluated	Herb
LYTHRACEAE	*Nesaea sagittifolia (Sond.) Koehne var. sagittifolia*	LC	Dwarf shrub
LYTHRACEAE	*Nesaea schinzii Koehne*	LC	Dwarf shrub
LYTHRACEAE	*Rotala filiformis (Bellardi) Hiern*	LC	Herb, hydrophyte
MALVACEAE	*Hermannia cordata (E.Mey. ex E.Phillips) De Winter*	LC	Herb
MALVACEAE	*Hermannia depressa N.E.Br.*	LC	Herb
MALVACEAE	*Hermannia grandistipula (Buchinger ex Hochst.) K.Schum.*	LC	Herb
MALVACEAE	*Hermannia jacobeifolia (Turcz.) R.A.Dyer*	LC	Dwarf shrub
MALVACEAE	*Hermannia lancifolia Szyszyl.*	LC	Herb
MALVACEAE	*Hermannia oblongifolia (Harv.) Hochr.*	LC	Herb
MALVACEAE	*Hibiscus microcarpus Garcke*	LC	Herb
MALVACEAE	*Malva parviflora L. var. parviflora*	Not Evaluated	Herb
MARSILEACEAE	*Marsilea capensis A.Braun*	LC	Herb, hydrophyte
MARSILEACEAE	*Marsilea macrocarpa C.Presl*	LC	Herb, hydrophyte
MESEMBRYANTHEMACEAE	*Aptenia cordifolia (L.f.) Schwantes*	LC	Succulent

Family	Species	Threat status	Growth forms
MOLLUGINACEAE	*Limeum viscosum (J.Gay) Fenzl subsp. viscosum var. glomeratum (Eckl. & Zeyh.) Friedrich*	LC	Herb
MOLLUGINACEAE	*Psammotropha mucronata (Thunb.) Fenzl var. mucronata*	LC	Herb
ONAGRACEAE	*Ludwigia palustris (L.) Elliott*	Not Evaluated	Herb, hydrophyte
ONAGRACEAE	*Oenothera rosea L'Hér. ex Aiton*	Not Evaluated	Herb
ONAGRACEAE	*Oenothera stricta Ledeb. ex Link subsp. stricta*	Not Evaluated	Herb
ONAGRACEAE	*Oenothera tetraptera Cav.*	Not Evaluated	Herb
ORCHIDACEAE	*Eulophia cooperi Rchb.f.*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia hians Spreng. var. hians*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia hians Spreng. var. nutans (Sond.) S.Thomas*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia leontoglossa Rchb.f.*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia ovalis Lindl. var. bainesii (Rolfe) P.J.Cribb & la Croix*	LC	Geophyte, herb
ORCHIDACEAE	*Eulophia ovalis Lindl. var. ovalis*	LC	Geophyte, herb
ORCHIDACEAE	*Habenaria bicolor Conrath & Kraenzl.*	NT	Geophyte, herb
ORCHIDACEAE	*Habenaria dregeana Lindl.*	LC	Geophyte, herb
ORCHIDACEAE	*Habenaria epipactidea Rchb.f.*	LC	Geophyte, herb
ORCHIDACEAE	*Habenaria falcicornis (Burch. ex Lindl.) Bolus subsp. caffra (Schltr.) J.C.Manning*	LC	Geophyte, herb
OROBANCHACEAE	*Alectra sessiliflora (Vahl) Kuntze var. sessiliflora*	LC	Herb, parasite
OROBANCHACEAE	*Cycnium tubulosum (L.f.) Engl. subsp. tubulosum*	LC	Herb
OROBANCHACEAE	*Harveya speciosa Bernh.*	LC	Herb, parasite
OROBANCHACEAE	*Sopubia cana Harv. var. cana*	LC	Herb, parasite
OROBANCHACEAE	*Striga bilabiata (Thunb.) Kuntze subsp. bilabiata*	LC	Herb, parasite
OROBANCHACEAE	*Striga gesnerioides (Willd.) Vatke*	LC	Herb, parasite
OXALIDACEAE	*Oxalis corniculata L.*	Not Evaluated	Herb
OXALIDACEAE	*Oxalis obliquifolia Steud. ex A.Rich.*	LC	Geophyte
PAPAVERACEAE	*Papaver aculeatum Thunb.*	LC	Herb
PLANTAGINACEAE	*Plantago lanceolata L.*	LC	Herb
PLANTAGINACEAE	*Plantago major L.*		Herb
POACEAE	*Agrostis eriantha Hack. var. eriantha*	LC	Graminoid
POACEAE	*Agrostis lachnantha Nees var. lachnantha*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. eckloniana (Nees) Gibbs Russ.*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. semialata*	LC	Graminoid
POACEAE	*Andropogon appendiculatus Nees*	LC	Graminoid
POACEAE	*Aristida congesta Roem. & Schult. subsp. congesta*	LC	Graminoid
POACEAE	*Arundinella nepalensis Trin.*	LC	Graminoid
POACEAE	*Bewsia biflora (Hack.) Gooss.*	LC	Graminoid
POACEAE	*Brachiaria eruciformis (Sm.) Griseb.*	LC	Graminoid
POACEAE	*Brachiaria serrata (Thunb.) Stapf*	LC	Graminoid

Family	Species	Threat status	Growth forms
POACEAE	*Calamagrostis epigejos (L.) Roth var. capensis Stapf*	LC	Graminoid
POACEAE	*Chloris gayana Kunth*	LC	Graminoid
POACEAE	*Ctenium concinnum Nees*	LC	Graminoid
POACEAE	*Cynodon hirsutus Stent*	LC	Graminoid
POACEAE	*Digitaria monodactyla (Nees) Stapf*	LC	Graminoid
POACEAE	*Digitaria tricholaenoides Stapf*	LC	Graminoid
POACEAE	*Echinochloa jubata Stapf*	LC	Graminoid
POACEAE	*Eleusine multiflora A.Rich.*	Not Evaluated	Graminoid
POACEAE	*Elionurus muticus (Spreng.) Kunth*	LC	Graminoid
POACEAE	*Eragrostis capensis (Thunb.) Trin.*	LC	Graminoid
POACEAE	*Eragrostis chloromelas Steud.*	LC	Graminoid
POACEAE	*Eragrostis cilianensis (All.) Vignolo ex Janch.*	LC	Graminoid
POACEAE	*Eragrostis curvula (Schrad.) Nees*	LC	Graminoid
POACEAE	*Eragrostis racemosa (Thunb.) Steud.*	LC	Graminoid
POACEAE	*Eragrostis sclerantha Nees subsp. sclerantha*	LC	Graminoid
POACEAE	*Eragrostis stapfii De Winter*	LC	Graminoid
POACEAE	*Eragrostis tef (Zuccagni) Trotter*	Not Evaluated	Graminoid
POACEAE	*Festuca scabra Vahl*	LC	Graminoid
POACEAE	*Harpochloa falx (L.f.) Kuntze*	LC	Graminoid
POACEAE	*Helictotrichon turgidulum (Stapf) Schweick.*	LC	Graminoid
POACEAE	*Imperata cylindrica (L.) Raeusch.*	LC	Graminoid
POACEAE	*Koeleria capensis (Steud.) Nees*	LC	Graminoid
POACEAE	*Leersia hexandra Sw.*	LC	Graminoid
POACEAE	*Leptochloa fusca (L.) Kunth*	LC	Graminoid
POACEAE	*Lolium perenne L.*	Not Evaluated	Graminoid
POACEAE	*Loudetia simplex (Nees) C.E.Hubb.*	LC	Graminoid
POACEAE	*Melinis nerviglumis (Franch.) Zizka*	LC	Graminoid
POACEAE	*Microchloa caffra Nees*	LC	Graminoid
POACEAE	*Panicum natalense Hochst.*	LC	Graminoid
POACEAE	*Panicum stapfianum Fourc.*	LC	Graminoid
POACEAE	*Paspalum dilatatum Poir.*	Not Evaluated	Graminoid
POACEAE	*Paspalum distichum L.*	LC	Graminoid
POACEAE	*Phalaris arundinacea L.*	Not Evaluated	Graminoid
POACEAE	*Poa annua L.*	Not Evaluated	Graminoid
POACEAE	*Polypogon monspeliensis (L.) Desf.*	Not Evaluated	Graminoid
POACEAE	*Setaria sphacelata (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. torta (Stapf) Clayton*	LC	Graminoid
POACEAE	*Sporobolus discosporus Nees*	LC	Graminoid
POACEAE	*Sporobolus pectinatus Hack.*	LC	Graminoid
POACEAE	*Stiburus conrathii Hack.*	LC	Graminoid
POACEAE	*Themeda triandra Forssk.*	LC	Graminoid

Family	Species	Threat status	Growth forms
POACEAE	*Tristachya leucothrix Trin. ex Nees*	LC	Graminoid
POACEAE	*Tristachya rehmannii Hack.*	LC	Graminoid
POACEAE	*Agrostis eriantha Hack. var. eriantha*	LC	Graminoid
POACEAE	*Agrostis lachnantha Nees var. lachnantha*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. eckloniana (Nees) Gibbs Russ.*	LC	Graminoid
POACEAE	*Alloteropsis semialata (R.Br.) Hitchc. subsp. semialata*	LC	Graminoid
POACEAE	*Andropogon appendiculatus Nees*	LC	Graminoid
POACEAE	*Aristida congesta Roem. & Schult. subsp. congesta*	LC	Graminoid
POACEAE	*Arundinella nepalensis Trin.*	LC	Graminoid
POACEAE	*Bewsia biflora (Hack.) Gooss.*	LC	Graminoid
POACEAE	*Brachiaria eruciformis (Sm.) Griseb.*	LC	Graminoid
POACEAE	*Brachiaria serrata (Thunb.) Stapf*	LC	Graminoid
POACEAE	*Calamagrostis epigejos (L.) Roth var. capensis Stapf*	LC	Graminoid
POACEAE	*Chloris gayana Kunth*	LC	Graminoid
POACEAE	*Ctenium concinnum Nees*	LC	Graminoid
POACEAE	*Cynodon hirsutus Stent*	LC	Graminoid
POACEAE	*Digitaria monodactyla (Nees) Stapf*	LC	Graminoid
POACEAE	*Digitaria tricholaenoides Stapf*	LC	Graminoid
POACEAE	*Echinochloa jubata Stapf*	LC	Graminoid
POACEAE	*Eleusine multiflora A.Rich.*	Not Evaluated	Graminoid
POACEAE	*Elionurus muticus (Spreng.) Kunth*	LC	Graminoid
POACEAE	*Eragrostis capensis (Thunb.) Trin.*	LC	Graminoid
POACEAE	*Eragrostis chloromelas Steud.*	LC	Graminoid
POACEAE	*Eragrostis cilianensis (All.) Vignolo ex Janch.*	LC	Graminoid
POACEAE	*Eragrostis curvula (Schrad.) Nees*	LC	Graminoid
POACEAE	*Eragrostis racemosa (Thunb.) Steud.*	LC	Graminoid
POACEAE	*Eragrostis sclerantha Nees subsp. sclerantha*	LC	Graminoid
POACEAE	*Eragrostis stapfii De Winter*	LC	Graminoid
POACEAE	*Eragrostis tef (Zuccagni) Trotter*	Not Evaluated	Graminoid
POACEAE	*Festuca scabra Vahl*	LC	Graminoid
POACEAE	*Harpochloa falx (L.f.) Kuntze*	LC	Graminoid
POACEAE	*Helictotrichon turgidulum (Stapf) Schweick.*	LC	Graminoid
POACEAE	*Imperata cylindrica (L.) Raeusch.*	LC	Graminoid
POACEAE	*Koeleria capensis (Steud.) Nees*	LC	Graminoid
POACEAE	*Leersia hexandra Sw.*	LC	Graminoid
POACEAE	*Leptochloa fusca (L.) Kunth*	LC	Graminoid
POACEAE	*Lolium perenne L.*	Not Evaluated	Graminoid
POACEAE	*Loudetia simplex (Nees) C.E.Hubb.*	LC	Graminoid
POACEAE	*Melinis nerviglumis (Franch.) Zizka*	LC	Graminoid
POACEAE	*Microchloa caffra Nees*	LC	Graminoid
POACEAE	*Panicum natalense Hochst.*	LC	Graminoid
POACEAE	*Panicum stapfianum Fourc.*	LC	Graminoid

Family	Species	Threat status	Growth forms
POACEAE	*Paspalum dilatatum Poir.*	Not Evaluated	Graminoid
POACEAE	*Paspalum distichum L.*	LC	Graminoid
POACEAE	*Phalaris arundinacea L.*	Not Evaluated	Graminoid
POACEAE	*Poa annua L.*	Not Evaluated	Graminoid
POACEAE	*Polypogon monspeliensis (L.) Desf.*	Not Evaluated	Graminoid
POACEAE	*Setaria sphacelata (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. torta (Stapf) Clayton*	LC	Graminoid
POACEAE	*Sporobolus discosporus Nees*	LC	Graminoid
POACEAE	*Sporobolus pectinatus Hack.*	LC	Graminoid
POACEAE	*Stiburus conrathii Hack.*	LC	Graminoid
POACEAE	*Themeda triandra Forssk.*	LC	Graminoid
POACEAE	*Tristachya leucothrix Trin. ex Nees*	LC	Graminoid
POACEAE	*Tristachya rehmannii Hack.*	LC	Graminoid
POLYGALACEAE	*Polygala gracilenta Burtt Davy*	LC	Herb
POLYGALACEAE	*Polygala hottentotta C.Presl*	LC	Dwarf shrub, herb
POLYGALACEAE	*Polygala transvaalensis Chodat subsp. transvaalensis*	LC	Herb
POLYGONACEAE	*Emex australis Steinh.*		Herb
POLYGONACEAE	*Oxygonum dregeanum Meisn. subsp. canescens (Sond.) Germish. var. canescens*	LC	Herb
POLYGONACEAE	*Rumex acetosella L. subsp. angiocarpus (Murb.) Murb.*		Herb
POLYGONACEAE	*Rumex crispus L.*	Not Evaluated	Herb
POLYGONACEAE	*Rumex lanceolatus Thunb.*	LC	Herb
POTAMOGETONACEAE	*Potamogeton nodosus Poir.*	LC	[No lifeform defined]
POTAMOGETONACEAE	*Potamogeton pectinatus L.*	LC	Herb, hydrophyte
RANUNCULACEAE	*Ranunculus multifidus Forssk.*		Herb
RHAMNACEAE	*Berchemia zeyheri (Sond.) Grubov*	LC	Tree
RHAMNACEAE	*Ziziphus zeyheriana Sond.*	LC	Dwarf shrub
RICCIACEAE	*Riccia atropurpurea Sim*		Bryophyte
RICCIACEAE	*Riccia okahandjana S.W.Arnell*		Bryophyte
ROSACEAE	*Rubus rigidus Sm.*	LC	Shrub
RUBIACEAE	*Anthospermum rigidum Eckl. & Zeyh. subsp. pumilum (Sond.) Puff*	LC	Dwarf shrub
RUBIACEAE	*Canthium inerme (L.f.) Kuntze*	LC	Shrub, tree
RUBIACEAE	*Kohautia amatymbica Eckl. & Zeyh.*	LC	Herb
RUBIACEAE	*Oldenlandia herbacea (L.) Roxb. var. herbacea*	LC	Herb
RUBIACEAE	*Pachystigma pygmaeum (Schltr.) Robyns*	LC	Dwarf shrub
RUBIACEAE	*Pentanisia angustifolia (Hochst.) Hochst.*	LC	Herb
RUBIACEAE	*Pygmaeothamnus chamaedendrum (Kuntze) Robyns var. setulosus Robyns*	LC	Dwarf shrub
RUBIACEAE	*Richardia brasiliensis Gomes*	Not Evaluated	Herb
SANTALACEAE	*Thesium deceptum N.E.Br.*	LC	Parasite, shrub

Family	Species	Threat status	Growth forms
SANTALACEAE	*Thesium transvaalense Schltr.*	LC	Dwarf shrub, herb, parasite
SCROPHULARIACEAE	*Chaenostoma neglectum J.M.Wood & M.S.Evans*	LC	Herb
SCROPHULARIACEAE	*Jamesbrittenia aurantiaca (Burch.) Hilliard*	LC	Herb
SCROPHULARIACEAE	*Limosella maior Diels*	LC	Herb, hydrophyte
SCROPHULARIACEAE	*Manulea paniculata Benth.*	LC	Herb
SCROPHULARIACEAE	*Mimulus gracilis R.Br.*	LC	Helophyte, herb, hydrophyte
SCROPHULARIACEAE	*Nemesia fruticans (Thunb.) Benth.*	LC	Dwarf shrub, suffrutex
SCROPHULARIACEAE	*Nemesia umbonata (Hiern) Hilliard & B.L.Burtt*	LC	Herb
SELAGINELLACEAE	*Selaginella dregei (C.Presl) Hieron.*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes hirta Sw. var. brevipilosa W.& N.Jacobsen*		Herb
SINOPTERIDACEAE	*Cheilanthes hirta Sw. var. hirta*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Cheilanthes viridis (Forssk.) Sw. var. glauca (Sim) Schelpe & N.C.Anthony*	LC	Geophyte, herb, lithophyte
SINOPTERIDACEAE	*Pellaea calomelanos (Sw.) Link var. calomelanos*	LC	Geophyte, herb, lithophyte
SOLANACEAE	*Solanum capense L.*	LC	Dwarf shrub, shrub
SOLANACEAE	*Solanum lichtensteinii Willd.*	LC	Dwarf shrub, shrub
SOLANACEAE	*Solanum sisymbriifolium Lam.*	Not Evaluated	Herb, shrub
SOLANACEAE	*Withania somnifera (L.) Dunal*	LC	Dwarf shrub, herb, shrub
THYMELAEACEAE	*Gnidia kraussiana Meisn. var. kraussiana*	LC	Dwarf shrub, shrub
THYMELAEACEAE	*Gnidia microcephala Meisn.*	LC	Dwarf shrub, shrub
VERBENACEAE	*Chascanum hederaceum (Sond.) Moldenke var. hederaceum*	LC	Herb
VERBENACEAE	*Verbena aristigera S.Moore*	Not Evaluated	Herb
XYRIDACEAE	*Xyris capensis Thunb.*	LC	Helophyte, herb, hydrophyte
ZANNICHELLIACEAE	*Zannichellia palustris L.*	LC	Herb, hydrophyte

APPENDIX 2: List of all recorded mammals species in QDS 2628AB. Data source: MammalMAP, 2018.

Family	Genus	Species	Subspecies	Common name	Red Data List
Bovidae	*Alcelaphus*	*buselaphus*	*caama*	Red Hartebeest	Least Concern
Bovidae	*Connochaetes*	*gnou*		Black Wildebeest	Least Concern
Bovidae	*Damaliscus*	*pygargus*	*phillipsi*	Blesbok	Least Concern
Bovidae	*Kobus*	*ellipsiprymnus*		Waterbuck	
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered
Bovidae	*Sylvicapra*	*grimmia*		Bush Duiker	Least Concern
Bovidae	*Taurotragus*	*oryx*		Common Eland	Least Concern
Emballonuridae	*Taphozous*	*mauritianus*		Mauritian Tomb Bat	Least Concern
Equidae	*Equus*	*quagga*		Plains Zebra	
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened

Giraffidae	*Giraffa*	*camelopardalis*	*camelopardalis*	Nubian Giraffe	Least Concern
Herpestidae	*Atilax*	*paludinosus*		Marsh Mongoose	Least Concern
Herpestidae	*Herpestes*	*sanguineus*		Slender Mongoose	Least Concern
Muridae	*Gerbilliscus*	*brantsii*		Highveld Gerbil	Least Concern
Muridae	*Mastomys*	*coucha*		Southern African Mastomys	Least Concern
Muridae	*Otomys*	*auratus*		Southern African Vlei Rat	
Muridae	*Rhabdomys*	*pumilio*		Xeric Four-striped Grass Rat	Least Concern
Mustelidae	*Aonyx*	*capensis*		African Clawless Otter	Least Concern
Nesomyidae	*Dendromus*	*mystacalis*		Chestnut African Climbing Mouse	Least Concern
Nesomyidae	*Mystromys*	*albicaudatus*		African White-tailed Rat	Endangered
Soricidae	*Crocidura*	*mariquensis*		Swamp Musk Shrew	Data Deficient
Thryonomyidae	*Thryonomys*	*swinderianus*		Greater Cane Rat	Least Concern
Vespertilionidae	*Neoromicia*	*capensis*		Cape Serotine	Least Concern

APPENDIX 3: List of all recorded butterfly species in QDS 2628AB. Data source: LepiMAP, 2018.

Family	**Genus**	**species**	**subspecies**	**RedlData List Status**
ARCTIIDAE	*Ceryx*	*anthraciformis*	*anthraciformis*	Not listed
ARCTIIDAE	*Siccia*	*caffra*	*caffra*	Not listed
ARCTIIDAE	*Utetheisa*	*pulchella*	*pulchella*	Not listed
CRAMBIDAE	*Achyra*	*coelatalis*	*coelatalis*	Not listed
CRAMBIDAE	*Hellula*	*undalis*	*undalis*	Not listed
CRAMBIDAE	*Marasmia*	*trapezalis*	*trapezalis*	Not listed
CRAMBIDAE	*Nomophila*	*noctuella*	*noctuella*	Not listed
CRAMBIDAE	*Spoladea*	*recurvalis*	*recurvalis*	Not listed
ETHMIIDAE	*Ethmia*	*circumdatella*	*circumdatella*	Not listed
GEOMETRIDAE	*Rhodometra*	*sacraria*	*sacraria*	Not Threatened
HESPERIIDAE	*Afrogegenes*			Not listed
HESPERIIDAE	*Coeliades*	*forestan*	*forestan*	Least Concern
HESPERIIDAE	*Gegenes*			Not listed
HESPERIIDAE	*Metisella*	*meninx*		Least Concern
HESPERIIDAE	*Spialia*	*asterodia*		Least Concern
HESPERIIDAE	*Spialia*	*ferax*		Least Concern
LYCAENIDAE	*Actizera*	*lucida*		Least Concern
LYCAENIDAE	*Aloeides*	*aranda*		Least Concern
LYCAENIDAE	*Aloeides*	*henningi*		Least Concern
LYCAENIDAE	*Aloeides*	*trimeni*	*trimeni*	Least Concern
LYCAENIDAE	*Anthene*	*definita*	*definita*	Least Concern
LYCAENIDAE	*Axiocerses*	*tjoane*	*tjoane*	Least Concern

Family	Genus	species	subspecies	RedlData List Status
LYCAENIDAE	*Azanus*	*jesous*		Least Concern
LYCAENIDAE	*Cacyreus*	*marshalli*		Least Concern
LYCAENIDAE	*Chilades*	*trochylus*		Least Concern
LYCAENIDAE	*Cupidopsis*	*cissus*	*cissus*	Least Concern
LYCAENIDAE	*Cupidopsis*	*jobates*	*jobates*	Least Concern
LYCAENIDAE	*Eicochrysops*	*messapus*	*mahallakoaena*	Least Concern
LYCAENIDAE	*Lampides*	*boeticus*		Least Concern
LYCAENIDAE	*Leptotes*			Not listed
LYCAENIDAE	*Leptotes*	*pirithous*	*pirithous*	Least Concern
LYCAENIDAE	*Lycaena*	*clarki*		Least Concern
LYCAENIDAE	*Tarucus*	*sybaris*	*sybaris*	Least Concern
LYCAENIDAE	*Uranothauma*	*nubifer*	*nubifer*	Least Concern
LYCAENIDAE	*Zintha*	*hintza*	*hintza*	Least Concern
LYCAENIDAE	*Zizeeria*	*knysna*	*knysna*	Least Concern
LYCAENIDAE	*Zizula*	*hylax*		Least Concern
NOCTUIDAE	*Achaea*	*catella*	*catella*	Not listed
NOCTUIDAE	*Achaea*	*echo*	*echo*	Not listed
NOCTUIDAE	*Brithys*	*crini*	*crini*	Not listed
NOCTUIDAE	*Chrysodeixis*	*acuta*	*acuta*	Not listed
NOCTUIDAE	*Cyligramma*	*latona*	*latona*	Not listed
NOCTUIDAE	*Dysgonia*	*angularis*	*angularis*	Not listed
NOCTUIDAE	*Eublemma*	*acarodes*	*acarodes*	Not listed
NOCTUIDAE	*Eublemma*	*anachoresis*	*anachoresis*	Not listed
NOCTUIDAE	*Eublemma*	*ornatula*	*ornatula*	Not listed
NOCTUIDAE	*Grammodes*			Not listed
NOCTUIDAE	*Grammodes*	*euclidioides*	*euclidioides*	Not listed
NOCTUIDAE	*Grammodes*	*exclusiva*	*exclusiva*	Not listed
NOCTUIDAE	*Grammodes*	*stolida*	*stolida*	Not listed
NOCTUIDAE	*Helicoverpa*	*armigera*	*armigera*	Not listed
NOCTUIDAE	*Radara*	*vacillans*	*vacillans*	Not listed
NOCTUIDAE	*Syngrapha*	*circumflexa*	*circumflexa*	Not listed
NOCTUIDAE	*Trichoplusia*	*orichalcea*	*orichalcea*	Not listed
NYMPHALIDAE	*Acraea*	*horta*		Least Concern
NYMPHALIDAE	*Acraea*	*neobule*	*neobule*	Least Concern
NYMPHALIDAE	*Byblia*	*ilithyia*		Least Concern
NYMPHALIDAE	*Catacroptera*	*cloanthe*	*cloanthe*	Least Concern
NYMPHALIDAE	*Charaxes*	*saturnus*	*saturnus*	Least Concern
NYMPHALIDAE	*Danaus*	*chrysippus*	*orientis*	Least Concern
NYMPHALIDAE	*Hypolimnas*	*misippus*		Least Concern
NYMPHALIDAE	*Junonia*	*hierta*	*cebrene*	Least Concern
NYMPHALIDAE	*Junonia*	*oenone*	*oenone*	Least Concern
NYMPHALIDAE	*Junonia*	*orithya*	*madagascariensis*	Least Concern
NYMPHALIDAE	*Phalanta*	*phalantha*	*aethiopica*	Least Concern
NYMPHALIDAE	*Precis*	*archesia*	*archesia*	Least Concern

Family	Genus	species	subspecies	RedlData List Status
NYMPHALIDAE	*Telchinia*	*cabira*		Least Concern
NYMPHALIDAE	*Telchinia*	*rahira*	*rahira*	Least Concern
NYMPHALIDAE	*Telchinia*	*serena*		Least Concern
NYMPHALIDAE	*Vanessa*	*cardui*		Least Concern
PAPILIONIDAE	*Papilio*	*demodocus*	*demodocus*	Least Concern
PAPILIONIDAE	*Papilio*	*nireus*	*lyaeus*	Least Concern
PIERIDAE	*Belenois*	*aurota*		Least Concern
PIERIDAE	*Belenois*	*creona*	*severina*	Least Concern
PIERIDAE	*Catopsilia*	*florella*		Least Concern
PIERIDAE	*Colias*	*electo*	*electo*	Least Concern
PIERIDAE	*Colotis*	*annae*	*annae*	Least Concern
PIERIDAE	*Colotis*	*vesta*	*argillaceus*	Least Concern
PIERIDAE	*Eurema*	*brigitta*	*brigitta*	Least Concern
PIERIDAE	*Mylothris*	*agathina*	*agathina*	Least Concern
PIERIDAE	*Mylothris*	*rueppellii*	*haemus*	Least Concern
PIERIDAE	*Pontia*	*helice*	*helice*	Least Concern
PTEROPHORIDAE				Not listed
SPHINGIDAE	*Acherontia*	*atropos*	*atropos*	Not listed
SPHINGIDAE	*Nephele*	*comma*	*comma*	Not listed
SPHINGIDAE	*Pseudoclanis*	*postica*	*postica*	Not listed

APPENDIX 3: Bird species that have been recorded in pentad 2610_2825. Data source:SABAP2, 2018.

Scientific Name	Common Name	Red Data List	Rate of Observations
Accipiter badius	Shikra, Shikra	LC	0.1
Accipiter melanoleucus	Sparrowhawk, Black	LC	0.3
Accipiter minullus	Sparrowhawk, Little	LC	0.1
Accipiter ovampensis	Sparrowhawk, Ovambo	LC	0.7
Acridotheres tristis	Myna, Common	LC	93.8
Acrocephalus arundinaceus	Reed-warbler, Great	LC	1.2
Acrocephalus baeticatus	Reed-warbler, African	LC	15.2
Acrocephalus gracilirostris	Swamp-warbler, Lesser	LC	37.7
Acrocephalus palustris	Warbler, Marsh	LC	0.7
Acrocephalus schoenobaenus	Warbler, Sedge	LC	1.0
Actitis hypoleucos	Sandpiper, Common	LC	1.6
Actophilornis africanus	Jacana, African	LC	5.2
Afrotis afraoides	Korhaan, Northern Black	LC	1.3
Aix galericulata	Duck, Mandarin	LC	0.1
Alcedo cristata	Kingfisher, Malachite	NT	3.2
Alcedo semitorquata	Kingfisher, Half-collared	LC	0.1
Alopochen aegyptiacus	Goose, Egyptian	LC	89.4
Amadina erythrocephala	Finch, Red-headed	LC	28.3

Scientific Name	Common Name	Red Data List	Rate of Observations
Amandava subflava	Waxbill, Orange-breasted	LC	4.2
Amaurornis flavirostris	Crake, Black	LC	6.3
Amblyospiza albifrons	Weaver, Thick-billed	LC	39.3
Anas capensis	Teal, Cape	LC	6.0
Anas erythrorhyncha	Teal, Red-billed	LC	29.7
Anas hottentota	Teal, Hottentot	LC	29.9
Anas hybrid	Duck, Hybrid Mallard	LC	1.4
Anas platyrhynchos	Duck, Mallard	LC	9.1
Anas smithii	Shoveler, Cape	LC	50.5
Anas sparsa	Duck, African Black	LC	5.0
Anas undulata	Duck, Yellow-billed	LC	62.5
Anhinga rufa	Darter, African	LC	35.8
Anser anser	Goose, Domestic	LC	23.6
Anthus cinnamomeus	Pipit, African	LC	15.4
Anthus leucophrys	Pipit, Plain-backed	LC	0.1
Anthus similis	Pipit, Long-billed	LC	0.2
Anthus vaalensis	Pipit, Buffy	LC	0.6
Apalis thoracica	Apalis, Bar-throated	LC	0.1
Apus affinis	Swift, Little	LC	16.7
Apus apus	Swift, Common	LC	0.5
Apus barbatus	Swift, African Black	LC	0.4
Apus caffer	Swift, White-rumped	LC	29.1
Apus horus	Swift, Horus	LC	0.7
Ardea cinerea	Heron, Grey	LC	35.8
Ardea goliath	Heron, Goliath	LC	18.1
Ardea melanocephala	Heron, Black-headed	LC	55.2
Ardea purpurea	Heron, Purple	LC	11.1
Ardeola ralloides	Heron, Squacco	LC	26.7
Asio capensis	Owl, Marsh	LC	2.9
Batis molitor	Batis, Chinspot	LC	0.3
Bostrychia hagedash	Ibis, Hadeda	LC	93.5
Bradypterus baboecala	Rush-warbler, Little	LC	32.0
Bubo africanus	Eagle-owl, Spotted	LC	0.5
Bubulcus ibis	Egret, Cattle	LC	49.2
Burhinus capensis	Thick-knee, Spotted	LC	40.0
Buteo rufofuscus	Buzzard, Jackal	LC	0.1
Buteo vulpinus	Buzzard, Steppe	LC	0.9
Butorides striata	Heron, Green-backed	LC	1.4
Calandrella cinerea	Lark, Red-capped	LC	4.2
Calidris alba	Sanderling, Sanderling	LC	0.1
Calidris ferruginea	Sandpiper, Curlew	LC	0.5
Calidris minuta	Stint, Little	LC	5.2
Campephaga flava	Cuckoo-shrike, Black	LC	0.1
Centropus burchellii	Coucal, Burchell's	LC	5.9

Scientific Name	Common Name	Red Data List	Rate of Observations
Cercomela familiaris	Chat, Familiar	LC	0.3
Certhilauda semitorquata	Lark, Eastern Long-billed	LC	0.1
Ceryle rudis	Kingfisher, Pied	LC	7.3
Chalcomitra amethystina	Sunbird, Amethyst	LC	8.8
Charadrius hiaticula	Plover, Common Ringed	LC	0.2
Charadrius pecuarius	Plover, Kittlitz's	LC	1.6
Charadrius tricollaris	Plover, Three-banded	LC	20.8
Chlidonias hybrida	Tern, Whiskered	LC	16.4
Chlidonias leucopterus	Tern, White-winged	LC	8.1
Chrysococcyx caprius	Cuckoo, Diderick	LC	13.9
Ciconia abdimii	Stork, Abdim's	LC	0.2
Ciconia ciconia	Stork, White	LC	0.7
Cinnyricinclus leucogaster	Starling, Violet-backed	LC	0.1
Cinnyris talatala	Sunbird, White-bellied	LC	18.7
Circaetus pectoralis	Snake-eagle, Black-chested	LC	0.3
Circus ranivorus	Marsh-harrier, African	EN	0.7
Cisticola aberrans	Cisticola, Lazy	LC	0.1
Cisticola aridulus	Cisticola, Desert	LC	1.5
Cisticola ayresii	Cisticola, Wing-snapping	LC	2.0
Cisticola fulvicapilla	Neddicky, Neddicky	LC	4.1
Cisticola juncidis	Cisticola, Zitting	LC	26.6
Cisticola lais	Cisticola, Wailing	LC	0.2
Cisticola textrix	Cisticola, Cloud	LC	2.9
Cisticola tinniens	Cisticola, Levaillant's	LC	41.3
Clamator jacobinus	Cuckoo, Jacobin	LC	0.1
Clamator levaillantii	Cuckoo, Levaillant's	LC	0.1
Colius striatus	Mousebird, Speckled	LC	60.4
Columba arquatrix	Olive-pigeon, African	LC	40.4
Columba guinea	Pigeon, Speckled	LC	60.9
Columba livia	Dove, Rock	LC	69.7
Corvus albus	Crow, Pied	LC	25.3
Corvus capensis	Crow, Cape	LC	0.1
Corythaixoides concolor	Go-away-bird, Grey	LC	58.8
Cossypha caffra	Robin-chat, Cape	LC	53.3
Coturnix coturnix	Quail, Common	LC	0.7
Creatophora cinerea	Starling, Wattled	LC	16.6
Crecopsis egregia	Crake, African	LC	0.2
Crex crex	Crake, Corn	LC	0.3
Crithagra atrogularis	Canary, Black-throated	LC	22.4
Crithagra flaviventris	Canary, Yellow	LC	3.1
Crithagra gularis	Seedeater, Streaky-headed	LC	5.5
Crithagra mozambicus	Canary, Yellow-fronted	LC	1.0
Cuculus solitarius	Cuckoo, Red-chested	LC	4.4
Cursorius temminckii	Courser, Temminck's	LC	0.4

Scientific Name	Common Name	Red Data List	Rate of Observations
Cygnus atratus	Swan, Black	LC	9.5
Cypsiurus parvus	Palm-swift, African	LC	44.8
Delichon urbicum	House-martin, Common	LC	0.7
Dendrocygna bicolor	Duck, Fulvous	LC	9.7
Dendrocygna viduata	Duck, White-faced	LC	42.2
Dendropicos fuscescens	Woodpecker, Cardinal	LC	1.2
Dicrurus adsimilis	Drongo, Fork-tailed	LC	0.1
Dryoscopus cubla	Puffback, Black-backed	LC	0.2
Egretta alba	Egret, Great	LC	3.3
Egretta ardesiaca	Heron, Black	LC	9.2
Egretta garzetta	Egret, Little	LC	13.7
Egretta intermedia	Egret, Yellow-billed	LC	8.0
Elanus caeruleus	Kite, Black-shouldered	LC	37.8
Emberiza tahapisi	Bunting, Cinnamon-breasted	LC	0.2
Eremopterix leucotis	Sparrowlark, Chestnut-backed	LC	0.2
Estrilda astrild	Waxbill, Common	LC	9.5
Euplectes afer	Bishop, Yellow-crowned	LC	13.8
Euplectes albonotatus	Widowbird, White-winged	LC	3.7
Euplectes ardens	Widowbird, Red-collared	LC	2.9
Euplectes axillaris	Widowbird, Fan-tailed	LC	3.9
Euplectes capensis	Bishop, Yellow	LC	0.1
Euplectes orix	Bishop, Southern Red	LC	80.4
Euplectes progne	Widowbird, Long-tailed	LC	17.3
Falco amurensis	Falcon, Amur	LC	3.6
Falco biarmicus	Falcon, Lanner	LC	0.1
Falco naumanni	Kestrel, Lesser	LC	0.2
Falco peregrinus	Falcon, Peregrine	LC	0.1
Falco rupicoloides	Kestrel, Greater	LC	0.4
Falco rupicolus	Kestrel, Rock	LC	0.2
Falco vespertinus	Falcon, Red-footed	LC	0.2
Fulica cristata	Coot, Red-knobbed	LC	85.7
Gallinago nigripennis	Snipe, African	LC	5.8
Gallinula chloropus	Moorhen, Common	LC	74.8
Glareola nordmanni	Pratincole, Black-winged	LC	0.7
Halcyon albiventris	Kingfisher, Brown-hooded	LC	0.2
Halcyon senegalensis	Kingfisher, Woodland	LC	0.7
Haliaeetus vocifer	Fish-eagle, African	LC	0.5
Himantopus himantopus	Stilt, Black-winged	LC	12.8
Hirundo abyssinica	Swallow, Lesser Striped	LC	1.1
Hirundo albigularis	Swallow, White-throated	LC	33.2
Hirundo cucullata	Swallow, Greater Striped	LC	40.5
Hirundo dimidiata	Swallow, Pearl-breasted	LC	0.1
Hirundo fuligula	Martin, Rock	LC	4.2
Hirundo rustica	Swallow, Barn	LC	28.0

Scientific Name	Common Name	Red Data List	Rate of Observations
Hirundo spilodera	Cliff-swallow, South African	LC	0.3
Indicator indicator	Honeyguide, Greater	LC	3.7
Indicator minor	Honeyguide, Lesser	LC	0.9
Ixobrychus minutus	Bittern, Little	LC	3.8
Jynx ruficollis	Wryneck, Red-throated	LC	12.0
Lagonosticta rubricata	Firefinch, African	LC	0.1
Lamprotornis nitens	Starling, Cape Glossy	LC	65.2
Laniarius atrococcineus	Shrike, Crimson-breasted	LC	0.1
Laniarius ferrugineus	Boubou, Southern	LC	4.2
Lanius collaris	Fiscal, Common (Southern)	LC	78.8
Lanius collurio	Shrike, Red-backed	LC	0.8
Lanius minor	Shrike, Lesser Grey	LC	0.8
Larus cirrocephalus	Gull, Grey-headed	LC	84.7
Larus dominicanus	Gull, Kelp	LC	0.1
Larus fuscus	Gull, Lesser Black-backed	LC	1.1
Larus hartlaubii	Gull, Hartlaub's	LC	0.1
Limosa lapponica	Godwit, Bar-tailed	LC	3.0
Lonchura cucullatus	Mannikin, Bronze	LC	0.5
Lophaetus occipitalis	Eagle, Long-crested	LC	0.5
Lybius torquatus	Barbet, Black-collared	LC	34.3
Macronyx capensis	Longclaw, Cape	LC	16.3
Megaceryle maximus	Kingfisher, Giant	LC	0.9
Melierax gabar	Goshawk, Gabar	LC	0.5
Merops apiaster	Bee-eater, European	LC	0.8
Merops bullockoides	Bee-eater, White-fronted	LC	0.4
Milvus aegyptius	Kite, Yellow-billed	LC	0.8
Mirafra africana	Lark, Rufous-naped	LC	2.3
Mirafra fasciolata	Lark, Eastern Clapper	LC	0.1
Motacilla aguimp	Wagtail, African Pied	LC	0.1
Motacilla capensis	Wagtail, Cape	LC	69.5
Muscicapa striata	Flycatcher, Spotted	LC	0.7
Mycteria ibis	Stork, Yellow-billed	LC	0.1
Myrmecocichla formicivora	Chat, Anteating	LC	0.8
Nectarinia famosa	Sunbird, Malachite	LC	0.1
Netta erythrophthalma	Pochard, Southern	LC	34.1
Netta rufina	Pochard, Red-crested	LC	0.2
Nilaus afer	Brubru, Brubru	LC	0.2
Numida meleagris	Guineafowl, Helmeted	LC	73.3
Nycticorax nycticorax	Night-Heron, Black-crowned	LC	13.4
Oena capensis	Dove, Namaqua	LC	1.2
Oenanthe monticola	Wheatear, Mountain	LC	10.6
Oenanthe pileata	Wheatear, Capped	LC	8.6
Onychognathus morio	Starling, Red-winged	LC	1.2
Ortygospiza atricollis	Quailfinch, African	LC	1.9

Scientific Name	Common Name	Red Data List	Rate of Observations
Oxyura maccoa	Duck, Maccoa	NT	26.3
Passer diffusus	Sparrow, Southern Grey-headed	LC	8.1
Passer domesticus	Sparrow, House	LC	65.9
Passer melanurus	Sparrow, Cape	LC	92.8
Pavo cristatus	Peacock, Common	LC	2.1
Pernis apivorus	Honey-buzzard, European	LC	0.1
Phalacrocorax africanus	Cormorant, Reed	LC	61.3
Phalacrocorax capensis	Cormorant, Cape	LC	0.1
Phalacrocorax carbo	Cormorant, White-breasted	LC	33.4
Philomachus pugnax	Ruff, Ruff	LC	6.5
Phoenicopterus minor	Flamingo, Lesser	NT	11.3
Phoenicopterus ruber	Flamingo, Greater	NT	42.2
Phoeniculus purpureus	Wood-hoopoe, Green	LC	33.0
Phylloscopus trochilus	Warbler, Willow	LC	2.0
Platalea alba	Spoonbill, African	LC	21.4
Plectropterus gambensis	Goose, Spur-winged	LC	38.5
Plegadis falcinellus	Ibis, Glossy	LC	63.4
Plocepasser mahali	Sparrow-weaver, White-browed	LC	0.8
Ploceus capensis	Weaver, Cape	LC	0.7
Ploceus cucullatus	Weaver, Village	LC	0.6
Ploceus intermedius	Masked-weaver, Lesser	LC	0.1
Ploceus velatus	Masked-weaver, Southern	LC	93.3
Podiceps cristatus	Grebe, Great Crested	LC	24.2
Podiceps nigricollis	Grebe, Black-necked	LC	6.6
Polyboroides typus	Harrier-Hawk, African	LC	2.0
Porphyrio madagascariensis	Swamphen, African Purple	LC	47.1
Prinia flavicans	Prinia, Black-chested	LC	10.5
Prinia subflava	Prinia, Tawny-flanked	LC	41.2
Prodotiscus regulus	Honeybird, Brown-backed	LC	0.2
Psittacula krameri	Parakeet, Rose-ringed	LC	0.2
Psophocichla litsipsirupa	Thrush, Groundscraper	LC	0.3
Pternistis swainsonii	Spurfowl, Swainson's	LC	13.8
Pycnonotus nigricans	Bulbul, African Red-eyed	LC	0.9
Pycnonotus tricolor	Bulbul, Dark-capped	LC	73.6
Quelea quelea	Quelea, Red-billed	LC	10.3
Rallus caerulescens	Rail, African	LC	2.1
Recurvirostra avosetta	Avocet, Pied	LC	7.2
Riparia cincta	Martin, Banded	LC	0.6
Riparia paludicola	Martin, Brown-throated	LC	21.4
Riparia riparia	Martin, Sand	LC	0.7
Rostratula benghalensis	Painted-snipe, Greater	LC	0.1
Sagittarius serpentarius	Secretarybird, Secretarybird	LC	0.2
Sarkidiornis melanotos	Duck, Comb	LC	0.7

Scientific Name	Common Name	Red Data List	Rate of Observations
Sarothrura rufa	Flufftail, Red-chested	LC	0.5
Saxicola torquatus	Stonechat, African	LC	43.6
Scleroptila levaillantoides	Francolin, Orange River	LC	0.1
Scopus umbretta	Hamerkop, Hamerkop	LC	1.2
Serinus canicollis	Canary, Cape	LC	0.2
Sigelus silens	Flycatcher, Fiscal	LC	6.1
Sphenoeacus afer	Grassbird, Cape	LC	0.2
Spreo bicolor	Starling, Pied	LC	9.4
Streptopelia capicola	Turtle-dove, Cape	LC	93.5
Streptopelia semitorquata	Dove, Red-eyed	LC	85.9
Streptopelia senegalensis	Dove, Laughing	LC	95.1
Struthio camelus	Ostrich, Common	LC	4.0
Sturnus vulgaris	Starling, Common	LC	0.2
Tachybaptus ruficollis	Grebe, Little	LC	61.7
Tachymarptis melba	Swift, Alpine	LC	0.1
Tadorna cana	Shelduck, South African	LC	1.0
Telophorus zeylonus	Bokmakierie, Bokmakierie	LC	2.7
Terpsiphone viridis	Paradise-flycatcher, African	LC	1.9
Thalassornis leuconotus	Duck, White-backed	LC	6.5
Threskiornis aethiopicus	Ibis, African Sacred	LC	87.9
Tockus nasutus	Hornbill, African Grey	LC	0.1
Trachyphonus vaillantii	Barbet, Crested	LC	63.0
Treron calvus	Green-pigeon, African	LC	0.2
Tricholaema leucomelas	Barbet, Acacia Pied	LC	0.4
Tringa glareola	Sandpiper, Wood	LC	4.4
Tringa nebularia	Greenshank, Common	LC	1.5
Tringa stagnatilis	Sandpiper, Marsh	LC	1.9
Turdoides jardineii	Babbler, Arrow-marked	LC	0.1
Turdus libonyanus	Thrush, Kurrichane	LC	0.2
Turdus smithi	Thrush, Karoo	LC	68.8
Turnix sylvaticus	Buttonquail, Kurrichane	LC	0.2
Tyto alba	Owl, Barn	LC	0.5
Tyto capensis	Grass-owl, African	LC	0.4
Upupa africana	Hoopoe, African	LC	22.7
Urocolius indicus	Mousebird, Red-faced	LC	57.9
Vanellus armatus	Lapwing, Blacksmith	LC	93.0
Vanellus coronatus	Lapwing, Crowned	LC	68.0
Vanellus senegallus	Lapwing, African Wattled	LC	41.3
Vidua macroura	Whydah, Pin-tailed	LC	19.6
Zosterops virens	White-eye, Cape	LC	41.4

APPENDIX 4: Approach and terminology used for the impact assessment

The identification of potential impacts should include impacts that may occur during the construction and operational phases of the activity. The assessment of impacts is to include direct, indirect as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts will include:

- Determine the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determine future changes to the environment that will occur if the activity does not proceed;
- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is to be applied to the prediction and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- **Spatial extent** – The size of the area that will be affected by the impact:
    - Site specific;
    - Local
    - Regional (within 30 km of site); or
    - National.
- **Intensity** –The anticipated severity of the impact:
    - High (severe alteration of natural systems, patterns or processes);
    - Medium (notable alteration of natural systems, patterns or processes; or
    - Low (negligible alteration of natural systems, patterns or processes).
- **Duration** –The timeframe during which the impact will be experienced:
    - Temporary (less than 1 year);
    - Short term (1 to 6 years);

  - Medium term (6 to 15 years);
  - Long term (the impact will only cease after the operational life of the activity); or
  - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).
- **Reversibility of impacts -**
  - High reversibility of impacts (impact is highly reversible at end of project life);
  - Moderate reversibility of impacts;
  - Low reversibility of impacts; or
  - Impacts are non- reversible (impact is permanent).
- **Irreplaceability of resource loss caused by impacts –**
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/ rehabilitate.

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact occurring:
  - Improbable (little or no chance of occurring);
  - Probable (<50% chance of occurring);
  - Highly probable (50 – 90% chance of occurring); or
  - Definite (>90% chance of occurring).
- **Significance** – Will the impact cause a notable alteration of the environment?
  - Low to very low (the impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Medium (the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or
  - High (the impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).
- **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
  - Positive - environment overall will benefit from the impact;
  - Negative - environment overall will be adversely affected by the impact; or
  - Neutral - environment overall will not be affected.
- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Impacts will then be collated into an EMP and these will include the following:

- Management actions and monitoring of the impacts;

- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts; and
- Positive impacts will be identified and enhanced where possible.

Table 1 below is to be used by specialists for the rating of impacts.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction and operation phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.
- Impacts should be assessed for all layouts and project components.

IMPORTANT: Impacts should be described both before and after the proposed mitigation and management measures have been implemented. The assessment of the potential impact "before mitigation" should take into consideration all management actions that are already part of the project design (which are a given). The assessment of the potential impact "after mitigation" should take into consideration any additional management actions proposed by the specialist, to minimise negative or enhance positive impacts.

APPENDIX 6 Letter of confirmation of External Review.

Attention: Rirhandzu Marivate / Minnelise Levendal

CSIR- Environmental Management Services
Implementation Unit
Tel: 021-888-2432
email: rmarivate@csir.co.za

21 March 2018

Our Ref: 2395

NSS

Natural Scientific Services CC
2003/077331/23

64A Coleraine Drive
Riverclub Ext 7
Sandton
2191

Tel: +27 (0) 11 787 7400
Fax: +27 (0) 11 784 7599

Email: post@nss-sa.co.za

Members:
Kathy Taggart - PrSciNat / MSc (WITS)
Susan Abell - PrSciNat / MSc (WITS)

Dear Rirhandzu and Minnelise

ECOLOGICAL REVIEW FOR THE SPECIAL SKILLS DEVELOPMENT PROJECT – INGWAZI TRADING CHICKEN FARM, GAUTENG

As requested by the CSIR- Environmental Management Services, NSS was appointed for the review of a number of terrestrial ecological scans that the CSIR has been involved in. This included the Ingwazi Trading Chicken Farming Project.

NSS conducted two detailed reviews on the Igwazi Ecological Scan report. The draft versions were submitted to NSS for review on 19 February 2018 and 14 March 2018. The NSS team members that conducted the review are highlighted in **Table 1** below.

Table 1. NSS Review Team

Team Member	Qualifications
Susan Abell Senior Ecologist & Vegetation Specialist	▪ *PrSciNat* Registered (400116/05) -Ecology and Environmental Science ▪ MSc – Resource Conservation Biology
Tyron Clark Faunal Specialist	▪ BSc Honours- Zoology ▪ MSc in progress

All comments and corrections made in the second review by NSS (dated 14 March 2018) must be addressed. As the extent of the site is small and is largely transformed, it is NSS's opinion that the approach and methodologies followed is sufficient for the purpose of the project and therefore no further site visits are warranted. If all comments made in the review process are addressed, then it is NSS's opinion that the report is consistent with the requirements set out in Appendix 6 of GN R326 Environmental Impact Assessment (EIA) Regulations, 7 April 2017.

Yours Sincerely,

Susan Abell
Natural Scientific Services

APPENDIX 5 Curriculum Vitae of Rirhandzu Marivate

CURRICULUM VITAE: RIRHANDZU MARIVATE

PO Box 320

Stellenbosch

7599

South Africa

Office : +27 21 888 2432

Cell : +27 76 183 0642

Fax : +27 21 888 2473

Email : rmarivate@csir.co.za

Position in Firm:	Junior Environmental Assessment Practitioner (305759)
Full Name:	Marivate, Rirhandzu Anna
Specialisation:	Environmental & Ecological Science
Professional Registration:	Cand. Sci. Nat. Environmental Sciences – Reg Number: 100147/14
Date of Birth:	23 February 1989
Nationality:	South African

BIOSKETCH

Rirhandzu holds a Bachelor degree in Zoology & Geology, Honours in Ecology, Environment and Conservation from the University of the Witwatersrand; and has environmental research experience with the University of Cape Town. The research focus has been within the domain of socioecology, looking at investigating local ecological knowledge of stakeholders on the provisioning of freshwater resources and its impacts on the management for of the Berg river in the Western Cape, South Africa. The research looked at how perception on resource utilisation affects management priorities, and creating a matrix of perceptions would be used a tool for better decision making within the Berg River Catchment Management Areas. Rirhandzu is currently studying towards her Master in Philosophy in Sustainable Development at the University of Stellenbosch. Here current research interest is looking at environmental planning and management within municipalities and how to optimise green spaces by including ecosystem goods and services to build resilience within those municipalities.

Since 2014, Rirhandzu has worked at the Council for Scientific and Industrial Research (CSIR) as an Environmental Assessment Practitioner (EAP) Intern within the Environmental Management Services (EMS) group, and from 2015 as a Junior Environmental Practitioner for the same group. Her duties include Assistance to other EAPs within EMS in their projects; Research in environmental assessment topics (e.g. indications, best practice, legislation); Report writing and project management; Participating in various forms of environmental assessments (BAs, EIAs, SEAs); consultation with stakeholders and public meetings; and Project administration (e.g. contracting and invoicing). She is particularly involved with the Special Needs and Skills Development (SNSD) Programme, which looks at assisting Community Trusts, Small, Micro to Medium Enterprises, with environmental services. She has also been involved with the Monitoring and Evaluation of the National Strategy for Sustainable Development by the Department of Environmental Affairs (DEA). Rirhandzu has established good client relationships and partnerships with the Land Bank, Department of Agriculture, Forestry and Fisheries (DAFF), and Department of Mineral Resources (DMR) through the SNSD Programme. She is involved as a stakeholder in the continuous consultations for the Development of Environmental Indices in response to the National Development Plan (NDP), led by the DEA.

Rirhandzu further involved with the Applied Centre for Climate and Earth Systems Sciences (ACCESS- NRE) as a national representative for the Student NEC and as a member of their Advisory Board for their Habitable Planet Programme. The HPW programme aims to educate undergraduate and high school learners in environmental and earth systems sciences, with the goal of encouraging them to pursue science careers.

EXPERIENCE

Completion Date	Project description	Role	Client
2014 (in progress)	**Special Needs and Skills Development Programme:** Programme management and conducting of Basic Assessments for disadvantaged communities/businesses/enterprises	**Project Manager;** Stakeholder Co-ordination; Project Support; Mentorship; Ecological Input	National Department of Environmental Affairs (DEA), South Africa
2013- 2014	**Monitoring and Evaluation** for the National Strategy for Sustainable Development and Action Plan.	**Project Member;**Stakeholder engagement, Researcher, Report Writing	National Department of Environmental Affairs (DEA), South Africa
2013-2015	**Strategic Environmental Assessment (SEA)** for wind and solar PV energy in South Africa.	Data Management	National Department of Environmental Affairs (DEA), South Africa
2014-2016	**Strategic Environmental Assessment (SEA)** for Electricity Grid Infrastructure (EGI).	Stakeholder Engagement	National Department of Environmental Affairs (DEA), South Africa
2014	**Screening Study (SS)** for the Development of Biochar and Composting Facilities to support land restoration near the proposed Ntambelanga Dam, Umzimvubu Catchment, Eastern Cape**.**	**Project Manager,** Project Research & Report Writing	National Department of Environmental Affairs (DEA), South Africa
2015	**Environmental Screening Study (ESS)** for projects undertaken in the Amatikulu Aquaculture Development Zone, KwaZulu-Natal.	**Project Manager,** Project Research & Report Writing	National Department of Agriculture, Forestry & Fisheries (DAFF), S Africa
2015-2016	**Development of Sustainability Indicators** for the National Integrated State of the Environment Report for Namibia.	**Project Manager**, Project Research & Report Writing	Ministry of Environment and Tourism (MET), Namibia
2016	**Basic Assessment** for the development of a 5.5ha pig production facility and a 2.5 ha chicken broiler facility on Farm Rietvalei, Portion 1 & 6, near Delmas, Mpumalanga.	**Project Manager**	Mokate Estates (Pty) Ltd
2016	**Basic Assessment** for the development of a 0.6 hectare Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.	**Project Manager**	Wanga Poultry (Pty) Ltd
2016	**Sustainable Development Appraisal for Gold Standard** on a microprogramme of the NOVA Brickstar Wood Stove in the Mahlaba Area, Limpopo.	**Project Member**, Project Researcher, Translator	Gold Standard Foundation
2017 (In Progress)	**Sustainable Development Goal Lab** on "Mainstreaming resilience into climate change adaptation and disaster risk planning."	**Project Member**	Future Earth; Stockholm Resilience Centre; University of Tokyo
In progress	**Basic Assessment** for the proposed development of a leisure and cultural village on Farm Moiloa 412-JO, Dinokana Village, North West.	**Project Manager**	Makadima Leisure & Cultural Village 101 (Pty) Ltd
In progress	**Basic Assessment** forthe expansion of a Chicken Layer Facility on a 4.4 hectare farm on plot 226 Withok Estate, Brakpan, Ekurhuleni District, Gauteng	**Project Manager**	Lewin AgriBusiness (Pty) Ltd
In progress	**Basic Assessment** for the expansion of a Chicken Broiler Facility on a 2.57 hectare farm on plot 62, Mapleton, Ekurhuleni District, Gauteng.	**Project Manager**	Mthunzi Chicken Supplier (Pty) Ltd
In progress	**GEF funded biodiversity and land use project**	**Technical/specialist support and mentoring**	South African Biodiversity Institute (SANBI)

PAST EMPLOYMENT RECORD

- **2014-2015**CSIR Environmental Management Services (EMS) Environmental Scientist and Assessment Practitioner(Intern).
- **2011-2013**UCT Environmental & Geographical Science Department (N Methner; K Vickery) Researcher &Teaching Assistant
- **2010** WITS School of Animal Plant & Environmental Sciences (Prof K Balkwill) Teaching Assistant.
- **2009** ESKOM Generation Environmental Management (D Herbst) Environmental Officer (Intern).
- **2009** WITS School of Geosciences (Dr G Drennan; Dr M Evans) Teaching & Field Assistant.
- **2008** WITS School of Animal Plant & Environmental Sciences (T Gardiner; Dr W Twine) Environmental Control &Field Assistant.
- **2008** Jane Goodall Institute (Dr L Duncan) Field Assistant.

QUALIFICATIONS

- **2010 University of the Witwatersrand (Wits) BSc Honours (Ecology, Environment and Conservation)**
  Coursework: Approaches to Science, Experimental Design and Biostatistics, Introduction to Statistics Computer programme R, Introduction to Geographic Information Systems, Global Change: Impact on Soils, Plants and the Environment, Ecological Engineering and Phytoremediation, Ethnoecology.
  Thesis: Species Composition and Population Structure of Trees Protected in Cultivated Fields of Rural Villages in the Bushbuckridge Region, Mpumalanga Province (Supervisors: Dr Wayne Twine, Prof Ed Witkowski)
- **2006 – 2009 University of the Witwatersrand (Wits) BSc (Zoology & Ecology)**
  Senior Courses: Research Report Writing; Exploration and Environmental Geochemistry; Introduction to Palaeoclimatology; Environmental Geomorphology; Diversity, Ecology and Economic Importance of Algae; Functional Ecology in Changing Environments; Ecological Communities and Biodiversity Conservation; Structural Geology; Igneous Petrology; Physics of the Earth and Plate Tectonics; Ore Petrology and Mineralisation Processes

SHORT-COURSES, CONFERENCES AND WORKSHOPS

- 2017 Ecosystem-Based Adaptation: Developing Capacity for Implementation, SANBI, Pretoria National Botanical Gardens, June 2017.
- 2015 Practical Adaptation for vulnerable communities by Adaptation Network, Kirstenbosch Botanical Gardens, Cape Town, August 2015.
- 2015 International Association for Impact Assessors South Africa (IAIAsa) National Annual Conference, August 2016, KZN.
- 2015 Sharpening the Tool: New Techniques & Methods in Environmental Impact Assessments, SE Solutions, Stellenbosch, Western Cape
- 2014 CiLLA Project Management I Course on July 2014 at CSIR Stellenbosch
- 2014 International Association for Impact Assessors South Africa (IAIAsa) Air Quality Management (AQM) Workshop on June 2014 in Western Cape
- 2014 South African Environmental Observation Network (SAEON) Graduate Student Network (GSN) Annual Conference September 2014, Eastern Cape.
- 2014 IAIAsa National Conference from August 2014 at Midrand, Gauteng
- 2014 African Student Energy (ASE) Annual Summit Cape Peninsula University of Technology June 2014, Western Cape
- 2014 International Association for Impact Association South Africa (IAIAsa) New National Environmental Management Act (NEMA) regulations March 2014 Western Cape
- 2014 Applied Centre for Climate and Earth Systems Sciences (ACCESS) facilitation for teacher training January 2014,WC.
- 2012 International Conference for Freshwater Governance for Sustainable Development November 2012, KwaZulu-Natal
- 2012 Society of South African Geographers (SSAG) Annual Conference at University of Cape Town June 2012, Western Cape
- 2011 Applied Centre for Climate and Earth System Sciences (ACCESS) teacher training, Western Cape
- 2011 BlueBuck Environmental Network Annual Summit at Rhodes University, Eastern Cape
- 2010 Biodiversity and People Mini-Symposium, University of the Witwatersrand, October 2010, Mpumalanga

LANGUAGES

	Speaking	Reading	Writing
Setswana	Excellent	Excellent	Excellent
Xitsonga	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

PROFESSIONAL REGISTRATIONS

- IAIA: Member of International Association of Impact Assessment South Africa (IAIAsa) since 5 February 2014.
- SACNASP: Registered as Candidate Natural Scientist with South African Council for Natural Scientific Professions (SACNASP) since July 2014. Registration number: 100147/14.

Draft Basic Assessment Report –
Proposed Ingwazi Trading (Pty) Ltd
Chicken Broiler Facility, 74 Dahlia Road,
Welgedacht A.H. Springs, Gauteng

Appendix H:
Environmental Management Programme (EMPr)

CONTENTS

TABLES

1 INTRODUCTION

This Environmental Management Programme (EMPr) is prepared as part of the requirements of the National Environmental Management Act (NEMA) EIA Regulations published in GNR 327, 326, 325 and 324 on the 4 December 2014 Government Gazette Number 40772, as amended on 7 April 2017. The EMPr is to be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) as part of the Application for Environmental Authorisation for the proposed Ingwazi Trading (Pty) Ltd Chicken Broiler Facility, 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng.

This EMPr is being made available for a 30-day review period, as part of the Draft Basic Assessment (BA) Report. Comments received from stakeholders during the aforementioned review period will be incorporated into the EMPr, where applicable. Following the incorporation of comments from stakeholders, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 Project Description

Ingwazi Trading (Pty) Ltd (hereafter, Ingwazi Trading), is a small scale commercial farming enterprise (small-holding) registered at 74 Dahlia Road, Welgedacht A.H. Springs, Gauteng. The property falls within Regiond D of the Ekurhuleni Metropolitan Municipality and falls on an urban edge. The site is currently zoned for agricultural use (Ekurhuleni MSDF, 2015).

The proposed project is aimed at providing "sustainable" products (i.e. broiler chickens) and ecologically responsible practices will be incorporated into the life cycle of the development.

The layout plan of the preferred alternative has been developed based on the outcome of the specialist study and sensitivity mapping. The total development footprint would thus be 1 ha. This will be broken down into the following:

Current infrastructure on site

Currently, the existing chicken facility has a footprint of 0.25 ha and consists of the following infrastructure:

- Farm house;
- 3 x chicken houses (2 are empty);
- Warehouse;
- 2 x boreholes;
- Storeroom;
- Vegetable garden;
- Small numbers of livestock; and
- Water tower and tank.

Proposed expansion (pertinent to this application)

Ingwazi proposes to construct the following additional facilities with a total footprint of 800 m² (Figure 2 below):

- 6 x chicken houses (each with a footprint of 8.5 x 30 m); and
- 1 x brooder house (with a footprint of 3.8m x 3m).

Bulk Services that may be required, i.e. sewerage, have already been installed privately to the satisfaction of the Municipality. A borehole exists on site for water provision for the proposed project. Power has been sourced from Eskom for the existing facility. Access roads to and on the site are already in existence.

1.2 Authors of the EMPr

This EMPr has been compiled by the Environmental Assessment Practitioners and the various specialists on the team (as indicated in Table 1). The details and expertise of the Environmental Assessment Practitioner and the specialists are provided in Appendices I of the Draft BA Report, respectively.

Table 1: EIA Team

Environmental Assessment Practitioner			
Name	**Organisation**	**Role**	**Qualification/Expertise**
Paul Lochner	CSIR	Reviewer	BSc Civil Engineering MPhil Environmental Science
Minnelise Levendal	CSIR	Project Leader	MSc Environmental Science
Kelly Stroebel	CSIR	Project Manager	BSc Hons (Environmental Science)
Specialist Team			
Name	**Organisation**	**Role/Specialist Study**	**Qualification/Expertise**
Rirhandzu Marivate	CSIR	Ecological Specialist	BSc Hons (Environmental Science)
Susan Abell	NSS	External peer review of the Ecological Specialist Study	M.Sc. Resource Conservation Biology (WITS). PrSciNat Registered (400116/05) – Ecology & Environmental Science.

2 APPROACH TO PREPARING THE EMPR

2.1 Compliance with Relevant Legislation

In terms of legal requirements, a crucial objective of the EMPr is to satisfy the requirements of National Environmental Management Act (NEMA) EIA Regulations published in GNR 327, 326, 325 and 324 on the 4 December 2014 Government Gazette Number 40772, as amended on 7 April 2017. These regulations regulate and prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this EMPr is presented in Table 2.

Table 2: Compliance with Section 33 of the EIA Regulations 2014 and Section 24N of the National Environmental Management Act (Act No. 107 of 1998)

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
2) The environmental management programme must contain- a) information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of: (i) planning and design; (ii) pre-construction and construction activities; (iii) the operation or undertaking of the activity in question; (iv) the rehabilitation of the environment; and (v) (v) closure, if applicable;	Section 4 to 7 and the columns detailing the impact description, mitigation and management objectives, and mitigation and management actions.
b) details of- (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Appendices I of the Draft BA Report to which this EMPr is attached.
c) a detailed description of the aspects of the activity that are covered by the environmental management programme;	Section 1
d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);	Columns in Section 4 to 7 of the EMPr regarding the monitoring responsibility, including the requirements for monitoring and reporting on compliance and the responsible parties noted in Section 3.
e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.
f) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of	Sections 4 to 7 of this EMPr, as applicable to the post-construction, rehabilitation phase and the decommissioning phase.

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
sustainable development; and	
g) a description of the manner in which it intends to- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) remedy the cause of pollution or degradation and migration of pollutants; and (iii) comply with any prescribed environmental management standards or practices.	The columns detailing the mitigation and management objectives, mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.
3) The environmental management programme must, where appropriate- a) set out time periods within which the measures contemplated in the environmental management programme must be implemented; b) contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation which may occur inside and outside the boundaries of the operations in question; and c) develop an environmental awareness plan describing the manner in which- (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.	The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.
5) The Minister, the Minister responsible for mineral resources or an MEC may call for additional information and may direct that the environmental management programme in question must be adjusted in such a way as the Minister, the Minister responsible for mineral resources or the MEC may require.	Not applicable at this stage.
6) The Minister, the Minister responsible for mineral resources or an MEC may at any time after he or she has approved an application for an environmental authorisation approve an amended environmental management programme.	Not applicable at this stage.
7) The holder and any person issued with an environmental authorisation- a) must at all times give effect to the general objectives of integrated environmental management laid down in section 23; b) must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment; c) must manage all environmental impacts (i) in accordance with his or her approved environmental management programme, where appropriate; and (ii) as an integral part of the prospecting or mining, exploration or production operation, unless the Minister responsible for mineral resources directs otherwise; d) must monitor and audit compliance with the requirements of the environmental management programme; e) must, as far as is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations	Throughout the EMPr

Requirements of Section 24N of NEMA	Where it is included in this EMPr?
to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and f) is responsible for any environmental damage, pollution, pumping and treatment of polluted or extraneous water or ecological degradation as a result of his or her operations to which such right, permit or environmental authorisation relates.	
8) Notwithstanding the Companies Act, 2008 (Act No. 71 of 2008), or the Close Corporations Act, 1984 (Act No. 69 of 1984), the directors of a company or members of a close corporation are jointly and severally liable for any negative impact on the environment, whether advertently or inadvertently caused by the company or close corporation which they represent, including damage, degradation or pollution.	Section 3 details the responsibility of the Project Applicant.

2.2 Content of the Draft EMPr

The EMPr includes the findings and recommendations of the BA Process and specialist studies. However, the EMPr is considered a "live" document and must be updated with additional information or actions during the design, construction, operational and decommissioning phases if applicable.

The EMPr follows an approach of identifying over-arching objectives, accompanied by management actions that are aimed at achieving these objectives. The management actions are presented in a table format in order to show the links between associated objectives, actions, responsibilities and monitoring requirements.

The management plans for the design, construction, operation and decommissioning phases consist of the following components:

- **Impact**: The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated.
- **Objectives**: The objectives necessary in order to meet the goal; these take into account the findings of the specialist studies.
- **Mitigation/Management Actions**: The actions needed to achieve the objectives, taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- **Monitoring**: The key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting.

2.3 Goal of Environmental Management

The overall goal for environmental management for the proposed Ingwazi Trading project is to construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Facilitates harmonious co-existence between the project and other land uses in the area; and
- Contributes to the environmental baseline and understanding of environmental impacts of broiler facilities in a South African context.

3 ROLES AND RESPONSIBILITIES

For the purposes of the EMPr, the generic roles that need to be defined are those of the:

- Project Developer;
- Environmental Control Officer;
- Environmental Health and Safety (EHS) Manager;
- Construction Manager (Lead Contractor or Engineering Consultant); and

It is acknowledged that the specific titles for these functions will vary from project to project. The intent of this section is to give a generic outline of what these roles typically require. It is expected that this will be appropriately defined at a later stage.

3.1 Project Developer

The Project Developer (i.e. Ingwazi Trading) is the 'owner' of the project and as such is responsible for ensuring that the conditions of the Environmental Authorisation issued in terms of NEMA (should the project receive such authorisation) are fully satisfied, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that the Project Developer will appoint the Environmental Control Officer, EHS Manager and Construction Manager

3.2 Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed to monitor the compliance of the proposed project with the conditions of Environmental Authorisation (should such authorisation be granted by GDARD) during the construction phase (and possibly the operational phase, depending on the requirements of GDARD). The ECO must also monitor compliance of the proposed project with environmental legislation and recommendations of the EMPr.

The ECO will be responsible for preparing the Final EMPr based on the Draft EMPr, as well as updating the EMPr as and when necessary, and compiling a monitoring checklist based on the EMPr. The roles and responsibilities of the ECO should include the following:

- The ECO must undertake periodic environmental audits during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances. It is recommended that weekly or bi-weekly environmental audits be undertaken by the ECO during the construction phase.
- Environmental compliance reports must be submitted by the ECO to the Competent Authority (i.e.GDARD) on a regular basis (i.e. monthly during the construction phase or as stipulated by the GDARD).
- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by GDARD) and relevant permits for reference purposes, a non-conformance register, a public complaint register, and a copy of previous environmental audits undertaken.
- Prior to the commencement of construction, the ECO must meet on site with the Construction Manager to confirm the construction procedure and designated construction areas.

3.3 EHS Manager

It is important to note that the EHS Manager will be appointed to fulfill the roles of the Environmental Officer during the construction phase and the Environmental Manager during the operational phase. A generic term has therefore been assigned to this sector of roles and responsibilities. The responsibility of the EHS Manager include overseeing the implementation of the EMPr during the construction and operational phases, monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessary. The EHS Manager is also responsible for monitoring compliance with the conditions of the Environmental Authorisation that may be issued to Ingwazi Trading.

The lead contractor and sub-contractors may have their own Environmental Officers, or designate Environmental Officer functions to certain personnel.

During construction, the EHS Manager will be responsible for the following:

- Meeting on site with the Construction Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Daily or weekly monitoring of site activities during construction to ensure adherence to the specifications contained in the EMPr and Environmental Authorisation (should such authorisation be granted by GDARD), using a monitoring checklist that is to be prepared at the start of the construction phase.
- Preparation of the monitoring report based on the daily or weekly site visit.
- Reporting of any non-conformances within 48 hours of identification of such non-conformance to the relevant agents.
- Conducting an environmental inspection on completion of the construction period and 'signing off' the construction process with the Construction Manager.

During operation, the EHS Manager will be responsible for:

- Overseeing the implementation of the EMPr and monitoring programmes for the operation phase.
- Reviewing the findings of the monitoring and highlight concerns to management and TNPA where necessary.
- Ensuring compliance with the Environmental Authorisation conditions.
- Ensuring that the necessary environmental monitoring takes place as specified in the EMPr.
- Updating the EMPr and ensuring that records are kept of all monitoring activities and results.

During decommissioning, the EHS Manager will be responsible for:

- Overseeing the implementation of the EMPr for the decommissioning phase; and
- Conducting an environmental inspection on completion of decommissioning and 'signing off' the site rehabilitation process.

At the time of preparing this EMPr, the EHS Manager appointment is still to be made by the proponent. The appointment is dependent upon the project proceeding to the construction phase.

Construction Manager (Lead Contractor or Engineering Consultant)

The lead contractor will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the facility.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employ an Environmental Officer (or have a designated Environmental Officer function) to monitor and report on the daily activities on-site during the construction period.
- Ensuring that safe, environmentally acceptable working methods and practices are implemented and that sufficient plant and equipment is made available, is properly operated and maintained in order to facilitate proper access and enable any operation to be carried out safely.
- Meeting on site with the EHS Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the programme.
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the EHS Manager.

At the time of preparing this EMPr, the appointment of a lead contractor has not been made and will depend on the project proceeding to the construction phase.

4 MANAGEMENT PLAN FOR DESIGN/CONSTRUCTION PHASE

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Alien Vegetation Management					
4.1. Removal of alien invasive vegetation from the proposed project area.	Ensure the correct removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants due to the project activities.	4.1.1. The planted alien invasive vegetation should be removed immediately (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a licenced waste disposal facility.	Monitor the removal of the alien invasive vegetation.	During the removal process	ECO
4.2. Increased Risk of Alien Plant Invasion	Reduce the establishment and spread of alien invasive plants due to the project activities.	4.2.1. Ensure compliance with relevant Environmental Specifications for the control and removal of these species. 4.2.2. All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods.	Monitor the presence of alien invasive plants during the construction phase.	Weekly	ECO
B. Indigenous Vegetation and Faunal Management					
4.3. Loss of endangered or medicinally important plant	To minimise loss of important or medicinally important plant species in accordance with law	4.3.1. Adhere to law and best practice guidelines regarding the displacement	Guidance from a suitably qualified vegetation specialist or horticulturist regarding the	During construction.	Contractor or Specialist

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
species	and best practice and encourage rehabilitation	of CI and medicinally important floral species.	collection, propagation/storage and transplantation of plants is advised.		
4.4. Mortality of fauna in surrounding areas	To reduce mortality rates and continued displacement of fauna in surrounding areas	4.4.1. Adhere to law and best practice guidelines regarding the displacement and relocation of CI fauna 4.4.2. Appropriately deal with fauna encountered on site. 4.4.3. Time construction activities to minimise faunal mortality 4.4.4. Limit indiscriminate killing, persecution or hunting of fauna.	• Prior to construction commission a suitably qualified ecologist to remove and relocate species to suitable surrounding habitats.. • Construction activities should be timed to start (and preferably end) during winter, when activity levels and the presence of breeding and migratory species are lowest. Bullfrogs are, however a concern in this regard as overwintering individuals may be unearthed during construction activities. • Ensure policies and procedures are in place regarding the handling and removal of fauna encountered on site. • Ensure that staff are trained and properly equipped to safely handle fauna or that the services of a trained professional are	Weekly	Project Developer and Specialist

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			readily available on call. • Construction activities should be timed to start (and preferably end) during winter, when activity levels and the presence of breeding and migratory species are lowest. Bullfrogs are, however a concern in this regard as overwintering individuals may be unearthed during construction activities. • Check open trenches for trapped animals (e.g. bullfrogs, hedgehogs and snakes), which should be carefully caught and relocated according to the specifications of a relevant specialist. • Prohibit the introduction of domestic animals such as dogs and cats. • Educate staff on prohibited actions involving the utilisation of wildlife (i.e. poaching / harvesting) through training and notices. • Routinely walk fence lines		

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			to remove snares.		
4.5. Sensory disturbance of faunal communities	Minimise sensory disturbance surrounding faunal communities	4.5.1. Appropriately time construction activities to minimise sensory disturbance to fauna.	Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least.	Daily	Project Developer EHS Manager
		4.5.2. Limit disturbances caused by noise	Noise should also be minimised throughout construction to limit the impact on sensitive fauna such as owls and large terrestrial birds.	Daily	Project Developer EHS Manager
		4.5.3. Limit disturbances caused by light	Limit construction activities to day time hours and Minimize or eliminate security and construction lighting, to reduce the disturbance of nocturnal fauna.	Daily	Project Developer EHS Manager
C. Noise Impacts					
4.6. Potential noise impact from operations during the construction phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that the piling noise is mitigated.	4.6.1. All operations should be conducted during daytime only (i.e. 06:00 – 22:00, as defined in South African National Standards (SANS) 10103).	Construction times to be monitored and managed (as well as included in the tender contract).	Daily	Contractor and EHS Manager
D. Visual Impacts					
4.7. Potential visual intrusion of construction/demolition activities on	Prevent unnecessary visual clutter from focusing attention of surrounding visual receptors on the proposed	4.7.1. The Contractor should maintain good housekeeping on site to avoid litter and minimise	Rubble/litter/waste removal and disposal to be monitored throughout construction.	Weekly or bi-weekly	Contractor and ECO

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
the views of sensitive visual receptors.	development.	waste. Ensure that rubble and litter are appropriately stored and regularly removed from site to a licenced waste disposal facility. 4.7.2. Dust generation must be kept at a minimum. 4.7.3. Night lighting of construction sites must be minimised within requirements of safety and efficiency.	Complaints about night lights should be investigated and documented in a register.		
E. Traffic Impacts					
4.8. Impact of construction vehicles on the road network and parking of construction vehicles on public roads when not in use.	Prevent unnecessary impacts on the surrounding road network by supplying parking for construction vehicles on site.	4.8.1. Accommodate all construction vehicles on site during the construction phase.	Monitor that no construction vehicles park on the outlying roads. Record and report non-compliance.	Daily during construction.	Contractor and EHS Manager
F. Safety, Health and Environment					
4.9. Noise generation from demolition and construction work (e.g. grinding and use of angle grinders), as well as	Reduce the potential noise impacts on the construction workers.	4.9.1. Construction personnel must wear proper hearing protection, which should be specified as part of the Construction Phase Risk Assessment carried out by	Inspections to be carried out during the construction phase to enforce the use of hearing protection by construction personnel. This must also be written into the safety	Throughout the construction phase (i.e. weekly).	ECO and Contractor

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
from the removal of waste material (e.g. crane and truck engines).		the Contractor. 4.9.2. The Contractor must ensure that all construction personnel are provided with adequate Personal Protective Equipment (PPE) for use where appropriate.	requirements of the Contract.		
4.10. Potential health injuries to construction personnel as a result of construction work (i.e. welding fumes, dust and smoke etc.).	Prevent respiratory illnesses caused to the construction personnel.	4.10.1. The Contractor must ensure that all construction personnel are provided with adequate PPE (such as dust masks) for use where appropriate.	• Inspections to be carried out during the construction phase to enforce the use of respiratory protection by construction personnel. This must also be written into the safety requirements of the Contract.	Throughout the construction phase (i.e. weekly).	ECO and Contractor
4.11. Potential impact on the safety of construction workers due to construction activities (such as welding, cutting, use of hot metals, working at heights, lifting of heavy items etc.).	Prevention of injuries to and fatalities of construction personnel during the construction phase.	4.11.1. Ensure that skilled, licenced and competent Contractors, riggers and crane operators are appointed during the construction phase, along with the use of certified equipment and scaffolding. 4.11.2. Ensure that roads are not closed during construction, which may restrict access for emergency services.	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the construction phase (i.e. weekly).	Project Developer, ECO and Contractor
4.12. Pollution of water and ground	Prevent unnecessary pollution impacts on the surrounding	4.12.1. The construction site should be cleaned regularly	Monitor activities and record and report non-compliance by	Throughout the construction phase.	Project Developer, ECO

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
as a result of spillages, generation of building rubble and waste scrap material.	environment.	and all construction waste (i.e. concrete, steel, rubble, packaging material etc.) must be removed from site and disposed at a licenced waste disposal facility by an approved waste Contractor. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal.	undertaking inspections.		and Contractor
G. Heritage Resources (Archaeology and Palaeontology)					
4.13. Impact on Archaeology and Palaeontology	Prevent damage and destruction to fossils, artefacts and materials of heritage significance.	4.13.1. Carry out general monitoring of excavations for potential fossil heritage, artefacts and material of heritage importance.	Monitor excavations and construction activities for archaeological and palaeontological materials.	Daily during excavation work.	Contractor and ECO
		4.13.2. All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist and to the PHRAG (or the South	Monitor excavations and construction activities for archaeological and palaeontological materials and report the finds accordingly. Contact PHRAG/SAHRA and the identified palaeontologist/ archaeologist if any heritage features are uncovered.	As required/necessary during construction.	Contractor and ECO

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material before construction re-commences.			
H. Water Conservation					
4.14. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during construction.	4.14.1. Water conservation to be practiced in line with Energy Saving Policies as follows: • Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). • Ensure that regular audits of water systems are conducted to identify possible water leakages.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO
		4.14.2. Carry out environmental awareness training with a discussion on water usage and conservation.	Conduct training for all construction personnel.	• Once-off during construction and ensure that all new staff are inducted.	EHS Manager, ECO and Contractor

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
I. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
4.15. Potential spillage of effluent (from portable sanitation facilities for construction personnel).	Reduce the spillage of domestic effluent and the impact thereof on the environment.	4.15.1. Ensure that normal sewage management practices are implemented during construction such as regularly emptying toilets and ensuring safe transport and disposal of sewage.	Monitor via site audits and record non-compliance and incidents (including incidents that nearly occur).	Monthly	EHS Manager and ECO
		4.15.2. Ensure that all domestic effluent/waste water is disposed safely at an appropriate, licenced facility by an appointed (suitable) service provider. Ensure that no discharge of waste water to the land surface is permitted. Proof of disposal (i.e. waybills) must be kept on file.	Monitor via site audits and record non-compliance and incidents. EHS Manager to audit disposal slips.	Monthly	EHS Manager and ECO
		4.15.3. Ensure that the toilet/sanitation facilities are maintained in a clean, orderly and sanitary condition.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager and Contractor
4.16. Contamination of soil and groundwater through spillage of concrete and cement.	To control concrete and cement batching activities in order to prevent spillages and concomitant contamination of soil, groundwater and the marine environment.	4.16.1. If any concrete mixing takes placed on site, this must be carried out on an impermeable surface (such as on boards or plastic sheeting and/or within a	Monitor the handling and storage of sand, stone and cement as instructed.	Daily	Project Developer, Contractor and EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		bunded area with an impermeable surface).			
		4.16.2. Concrete mixing areas must be fitted with a containment facility for the collection of cement-laden water. This facility must be impervious to prevent soil and groundwater contamination.			
		4.16.3. Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains.			
		4.16.4. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted.			
		4.16.5. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility.			
		4.16.6. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. Sand and			

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		aggregates containing cement must be kept damp to prevent the generation of dust.			
		4.16.7. Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed at a registered disposal facility.			
J. Waste Water Management					
4.17. Pollution caused by spillage or discharge of construction waste water into the surrounding environment.	Reduce construction waste water discharge into the environment and the resulting impact.	4.17.1. Implement proper construction site management actions such as the installation of containment structures, good on-site housekeeping (regular sweeping of roadways and work areas, reporting systems and environmental awareness training), and spillage management.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager
K. Stormwater Management					
4.18. Pollution of the surrounding environment as a result of contamination of stormwater.	Reduce the contamination of stormwater.	4.18.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the construction phase.	Compile Method Statement	Once off (and thereafter updated as required).	Contractor
		4.18.2. Provide secure storage for	Monitor the bunding and	Weekly	EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
Contamination could result from chemicals, oils, fuels, sewage, solid waste, litter etc.		oil, chemicals and other waste materials in order to prevent contamination of stormwater runoff.	containment structures.		
		4.18.3. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	Monitor via site audits and record non-compliance and incidents (i.e. by implementing walk through inspections).	Weekly	Contractor, EHS Manager and ECO
L. Waste Management					
4.19. Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste (general and hazardous).	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	4.19.1. General waste and hazardous waste should be stored temporarily on site in suitable (and correctly labelled) waste collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate.	Inspection of the temporary waste storage area.	Daily	EHS Manager
		4.19.2. Should the on-site storage of general waste and hazardous waste exceed 100 m^3 and 80 m^3 respectively, then the National Norms and Standards for the Storage of Waste (published on 29 November 2013 under Government Notice 926)			

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		must be adhered to.			
		4.19.3. Ensure that the construction site is kept clean at all times and that construction personnel are made aware of correct waste disposal methods.	Conduct training for all construction personnel.	• Once-off during construction and ensure that all new staff are inducted. • Discuss weekly during HSSE meetings.	EHS Manager, ECO and Contractor
		4.19.4. Ensure that sufficient general waste disposal bins are provided for all construction personnel throughout the site. These bins must be emptied on a regular basis.	Monitor waste generation and collection throughout the construction phase.	Daily	EHS Manager and Contractor
		4.19.5. No solid waste may be burned or buried on site.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager
		4.19.6. Segregation of hazardous waste from general waste to be in place.	On-site inspection of waste segregation.	Weekly	EHS Manager
M. Air Quality Management					
4.20. Air Quality Impact: Emissions from construction vehicles and generation of dust as a result of earthworks,	Reduce dust emissions during construction activities.	4.20.1. Ensure that cleared (excavated) areas and unpaved surfaces are sprayed with water (obtained from an approved source) to minimise dust generation.	• Monitor dust suppression mechanisms and record non-compliances.	• During complaints/incidents	EHS Manager, ECO and Contractor

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
demolition, as well as the delivery and mixing of construction materials.		Approved soil stabilisers may be utilised to limit dust generation.			
N. Socio-Economic Management					
4.21. Employment creation and skills development opportunities during the construction phase.	Maximise local employment and local business opportunities to promote and improve the local economy.	4.21.1. Enhance the use of local labour and local skills as far as reasonably possible.	Maximise local employment for unskilled labour and provincial/ national skilled labour.	During the construction phase.	Contractor and ECO
		4.21.2. Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained.			
		4.21.3. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.			
O. Environmental Awareness and Site Camp Establishment					
4.22. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	4.22.1. Encourage the use of energy saving equipment at the construction camp site (such as low voltage lights and low pressure taps) and promote recycling. Construction personnel must be made aware of	• Contractor to monitor energy usage via site investigations. • Conduct training for all construction personnel.	• Monthly	• Contractor • EHS Manager, ECO and Contractor

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		energy conservation practices as part of the environmental awareness training programme.			
4.23. Inappropriate planning of site camp establishment.	Ensure that environmental issues are taken into consideration in the planning for site establishment.	4.23.1. Ensure that the site establishment is designed and carried out in line with the requirements of relevant specifications and the landowner.	Monitor compliance and record non-compliance and incidents.	Before construction	EHS Manager
4.24. Soil erosion in the surrounding environment	To limit dust and erosion	4.24.1. Implement effective measures to control dust and erosion	• Commence (and preferably complete) construction during winter, when the risk of erosion should be least. • Erosion protection measures must be implemented on the site to reduce erosion and sedimentation of the receiving environment. Measures could include bunding around soil stockpiles; and vegetation of areas not to be developed. • Adequate dust control strategies should be applied to minimise dust deposition, for example: Periodic spraying of the	During construction	EHS Manager and Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			entrance road and environmentally-friendly dust control measures (e.g. mulching and wetting) where and when dust is problematic		

5 MANAGEMENT PLAN FOR OPERATIONAL PHASE

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Alien Vegetation Management					
5.1. Potential re-establishment of alien plants on site.	Ensure the correct removal of alien invasive vegetation from the proposed project area and prevent the establishment and spread of alien invasive plants.	5.1.1. Alien invasive vegetation should be removed immediately (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a licenced waste disposal facility.	Monitor the removal of the alien invasive vegetation. An Invasive species control plan should be actively implemented within the study area and Open Space system for at least 12 months (every 3 months).	During the removal process and for at least 12 months (every 3 months).	EHS Manager
B. Noise Impacts					
5.2. Potential noise impact from road transport of products during the operational phase (i.e. increased road traffic).	Prevent unnecessary impacts on the surrounding environment by ensuring that the drivers of road tankers minimise the use of air brakes.	5.2.1. All drivers of the road tankers should receive training regarding the use of air brakes.	Training of drivers	During induction of drivers to site rules.	Project Developer
C. Visual Impacts					
5.3. Potential impact of night lighting of the development on the nightscape	Prevent night lights from impacting on surrounding visual receptors by minimizing glare and light spill.	5.3.1. Outside and security lights must use light fixtures that shield the light and focus	Complaints referring to lighting at night should be documented, investigated and resolved.	When complaints are received.	Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
of the surrounding landscape.		illumination onto specific areas as required. 5.3.2. Elevated lights should be avoided, or carefully shielded to minimise glare.			
D. Traffic Impacts					
5.4. Impact of extra vehicles during the operational phase.	Prevent unnecessary or excessive heavy vehicles.	5.4.1. Implement good logistics planning during the operational phase.	Compile a scheduled loading time programme to minimise potential delay in loading.	Permanent over the lifespan of terminal.	Project Developer
E. Safety, Health and Environment					
5.5. Pollution of water and the ground as a result of potential spills of the stored product.	Prevent unnecessary pollution impacts on the surrounding environment.	5.5.1. Scheduled inspections should be implemented in order to assure and verify the integrity of hoses, piping and storage and septic tanks.	Carry out thorough inspections of piping, loading hoses, and bunding for leaks, using a checklist.	Daily	Project Developer
		5.5.2. The operating personnel should undergo proper training to prevent pollution incidents.	Proof of attendance to training sessions to be kept on file at the terminal.	Once off (and thereafter as required for new operating personnel).	Project Developer.
		5.5.3. Ensure that excrement, carcasses, feed, and other operational waste	Adhere to best practice broiler management and waste disposal norms.	Throughout Operation	Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment.	Ensure that if vehicles, equipment or visiting personnel are to be decontaminated make sure this is done in a designated area that can effectively contain excess disinfectants / biocides / surfactants.		
5.6. Atmospheric pollution due to fumes	Prevent unnecessary air pollution impacts as a result of the operational procedures.	5.6.1. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the terminal as required.	• Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company. • Comply with the permit to work system.	• Annually	Project Developer
5.7. Potential impact on the health of operating personnel resulting in potential health injuries.	To ensure that there are no adverse effects on the health of operating personnel.	5.7.1. Operational personnel must wear basic PPE (i.e. gloves) as necessary during the operational phase.	• Medical investigations or surveillance to be undertaken for the operating personnel. • Keep a register of the medical records for the operating personnel.	• Once-off for every operating person. • Once every five years for the life of the installation.	Project Developer
5.8. Minor accidents to the public and moderate accidents to operational staff (e.g. fires).	Ensure operating personnel or the public are not affected or injured by heat from possible fires.	5.8.1. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the terminal as required.	• Draw up a schedule for inspections and maintenance. • Assurance of functionality of fire extinguishers via inspections and	• Once initially and revise as reliability of equipment is assessed. • Annually • Annually	Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			certification by an accredited fire service company. • Draw up a schedule of safety audits.	• Annually	
5.9. Increase in pest invertebrates, spread of disease and mortality of chickens.	Highly localized pest invertebrate control that does not affect non-target populations or taxa	5.9.1. Detect and control pest infestations before they become a problem through frequent and careful cleaning, monitoring and control.	• Rinse floors regularly • Provide sufficient ventilation and airflow to keep the chicken house (floors, bedding, fodder) as dry as possible. • Check to see that fan louvers are properly working and close completely when the fan is not running. • Properly screed concrete floors to effectively seal all cracks and limit the pooling of effluent on site. • Use appropriately sloped and slated floors to facilitate drainage • Clean up excess fodder regularly from under troughs and feed bins • Effectively drain storm water from around chicken houses	As necessary	EHS Manager and Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			• Keep areas surrounding chicken houses free of spilled manure and litter • Remove all trash, and sources of feed and water for pests from the outside perimeter of the facilities. • Keep grass and weeds mowed to 5cm or less immediately around the facilities, to prevent insect growth • Electrocution devices are available to kill flies, while other mechanical devices include traps, sticky tapes or baited traps.		
		5.9.2. Detect pest infestations before they become a problem through frequent and careful monitoring.	• Manage and prevent access to fodder, especially feed wastage around the houses, feeders. • Control rodents through effective sanitation, rodent proofing and killing. • Glue boards and traps can be used in small areas, but in larger areas (over 12,000 sq ft) baits	As necessary	EHS Manager and Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			are more practical. • Rodenticides are not advised. • The most effective control for indigenous birds is screening production house air inlets and open windows with 2x2cm wire mesh.		
6.10 Increase in odour to surrounding residents from facility	Ensure the odours from the facility to not have a detrimental effect on nearby residents/operations.	5.9.3. Maintain good waste management practices. 5.9.4. Ensure the design of the facility compensates for good ventilation and cleanliness. 5.9.5. Monitor odours regularly by conducting assessments.	• Rinse floors regularly • Provide sufficient ventilation and airflow to keep the chicken house (floors, bedding, fodder) as dry as possible. • Check to see that fan louvers are properly working and close completely when the fan is not running. • Properly screed concrete floors to effectively seal all cracks and limit the pooling of effluent on site. • Use appropriately sloped and slated floors to facilitate drainage • Clean up excess fodder regularly from under troughs and feed bins	As necessary	EHS Manager and Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			• Effectively drain storm water from around chicken houses • Keep areas surrounding chicken houses free of spilled manure and litter • Remove all trash, and sources of feed and water for pests from the outside perimeter of the facilities. • Maintain the cleanliness of the facility by removing waste efficiently and effectively.		
6.11 Increase in nuisance flies	Ensure the fly increase is managed and kept to an acceptable level	5.9.6. Maintain good waste management practices. 5.9.7. Ensure the design of the facility compensates for good ventilation and cleanliness. 5.9.8. Monitor odours regularly by conducting assessments.	• Manage and prevent access to fodder, especially feed wastage around the houses, feeders. • Keep areas surrounding chicken houses free of spilled manure and litter. • Rinse floors regularly • Provide sufficient ventilation and airflow. • Ensure odours are managed (6.10).	As necessary	EHS Manager and Project Developer
F. Water Conservation					

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
5.10. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during operations.	5.10.1. Water conservation to be practiced in line with Energy Saving Policies as follows: - Cleaning methods utilised for cleaning vehicles, floors, the chicken houses etc. should aim to minimise water use (e.g. sweep before wash-down). - Ensure that regular audits of water systems are conducted to identify possible water leakages.	Record water usage, conduct audits and record non-compliance and incidents.	Monthly	Project Developer
G. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
5.11. Potential spillage of domestic effluent from the sewer as a result of the operation.	Reduce the spillage of domestic effluent and the impact thereof on the environment.	5.11.1. A maintenance plan for the management of the sewer pipes in cases of emergency should be developed.	Compile sewer maintenance plan.	Once off (and thereafter updated as required during the operational phase).	Project Developer
5.12. Potential spillage of chicken effluent.	Reduce likelihood of spillage of chicken effluent.	5.12.1. Proper management of fertilizer separation and transportation of waste should be maintained.	Adhere to waste removal from chicken houses and effluent separation best practice.	Once off (and thereafter updated as required during the operational phase).	Project Developer
5.13. Human Health effects due to emergency on site	Reduce effects on human health and/or death by having a thorough emergency preparedness plan in place and trained staff to execute this	5.13.1. Develop a sound evacuation and emergency preparedness plan in the event of explosions,	Compile plan and train personnel to execute this plan in the event of an emergency. Actions in plan could include: - Proper escape routes	Once off (and thereafter updated as required during the operational phase).	Project Developer

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
	plan.	fire etc.	according to the design on the facility once it is operational. - Proper use of fire extinguishers etc. - Protocol to be followed in the event of explosions etc. - Protocol to be followed in the event of a death or injury to an employee.		
H. Stormwater Management					
5.14. Increased stormwater discharge into the surrounding environment.	Reduce the impact of increased stormwater discharge to the environment.	5.14.1. A suitable stormwater/ surface water quality monitoring programme should be established and implemented.	Implement surface water quality monitoring programme, based on consultation with the landowner	As agreed during the operational phase.	Project Developer
		5.14.2. Regular inspections of stormwater infrastructure should be undertaken to ensure that it is kept clear of all debris and weeds.	Undertake regular inspections of the stormwater infrastructure (i.e. by implementing walk through inspections).	Weekly/Monthly	Terminal Manager and EHS Manager
I. Waste Management					
5.15. Pollution of the surrounding environment as a result of the handling, temporary storage	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	5.15.1. Sufficient waste collection bins and skips (or similar) should be provided. Waste collection bins and skips should be covered with	Monitor waste generation and collection throughout the operational phase.	Weekly	EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
and disposal of solid waste (general and hazardous).		suitable material and correctly labelled.			
		5.15.2. Segregation of hazardous waste from general waste to be in place.	On-site inspection of waste segregation.	Weekly	EHS Manager
		5.15.3. Ensure that the terminal is kept clean at all times and that operational personnel are made aware of correct waste disposal methods.	• Conduct training for all operational personnel. • Monitor the state of terminal via site audits and record non-compliance and incidents.	• Once-off during operations and ensure that all new staff are inducted. Carry out discussions during HSSE meetings as well. • Daily	EHS Manager
		5.15.4. No solid waste may be burned or buried on site.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager
		5.15.5. Waste amounts shall be recorded on a monthly basis.	Waste amounts to be documented.	Monthly	EHS Manager/ Terminal Manager
J. Air Quality Management					
5.16. Emissions from staff vehicles and road tankers	Reduce odours during the operational phase.	5.16.1. Ensure that the proposed project is operated in such a manner whereby	• Monitor via site audits and record non-compliance and incidents.	• Daily • When complaints are made.	EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		potential odours are minimised.	• Complaints about odours should be investigated and documented in a register.		
K. Socio-Economic Management					
5.17. Employment creation and skills development opportunities during the operational phase.	Maximise local employment and local business opportunities to promote and improve the local economy.	5.17.1. Enhance the use of local labour and local skills as far as reasonably possible.	Maximise local employment for unskilled labour and provincial/ national skilled labour.	During the operational phase.	Project Developer
		5.17.2. Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained.			
		5.17.3. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.			
5.18. Increase in pork and fresh produce in the local Rooiwal/Onderstepoort area	Maximise positive impacts through ensuring produce is sold to local markets	5.18.1. Ensure that the proposed project has secured local buyers.	Seek out local markets & secure formal trade agreements.	Monthly	Project developer
L. Environmental Awareness and Terminal Management					
5.19. Increased energy	Reduce energy consumption where possible.	5.19.1. Encourage the use of energy saving	Monitor energy usage via site investigations.	Monthly	EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
consumption during the operational phase.		equipment (such as low voltage lights and low pressure taps) and promote recycling. Operational personnel must be made aware of energy conservation practices as part of the environmental awareness training programme.	Conduct training for all operational personnel.		
5.20. Inappropriate behaviour of terminal staff during the operational phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that staff are aware of the requirements of the EMPr.	5.20.1. Designate smoking areas where the fire hazard could be regarded as insignificant.	Adhoc checks to ensure workers are smoking only in designated areas.	Daily	EHS Manager
		5.20.2. Open fires must be prohibited. Appropriate fire safety training should also be provided to staff that are to be on site for the duration of the operational phase.			
		5.20.3. Fire-fighting equipment must be made available at various appropriate locations.			

6 MANAGEMENT PLAN FOR DECOMMISSIONING PHASE

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Visual Impacts					
6.1. Potential visual intrusion of decommissioning activities on the existing views of sensitive visual receptors.	Prevent unnecessary visual clutter from focusing attention of surrounding visual receptors on the proposed development.	6.1.1. Ensure that rubble and litter are appropriately stored and regularly removed from site to a licenced waste disposal facility. 6.1.2. Dust generation must be kept at a minimum. 6.1.3. Night lighting of work (decommissioning) sites must be minimized within requirements of safety and efficiency.	Rubble/litter/waste removal and disposal to be monitored throughout decommissioning. Complaints about night lights should be investigated and documented in a register.	Weekly or bi-weekly	Contractor and ECO
B. Safety, Health and Environment					
6.2. Noise generation from demolition activities (e.g. grinding, steel falling, use of angle grinders) during the decommissioning phase.	Reduce the potential noise impacts on the decommissioning personnel.	6.2.1. Decommissioning personnel must wear proper hearing protection, which should be specified as part of the Decommissioning Phase Risk Assessment carried out by the Contractor. 6.2.2. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE for use where appropriate.	Inspections to be carried out during the decommissioning phase to enforce the use of hearing protection by decommissioning personnel. A checklist should be generated in this regard to ensure adherence to the safety requirements. This must also be written into the	Throughout the decommissioning phase.	ECO and Contractor

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			safety requirements of the Contract.		
6.3. Potential health injuries to demolition staff during the decommissioning phase.	Prevent respiratory illnesses caused to the decommissioning personnel.	6.3.1. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE (such as dust masks) for use where appropriate. 6.3.2. The Contractor must prescribe, to decommissioning personnel, what is required by the OTGC permit to work system.	Inspections to be carried out during the decommissioning phase to enforce the use of respiratory protection by decommissioning personnel. This must also be written into the safety requirements of the Contract.	Throughout the decommissioning phase.	ECO and Contractor
6.4. Heavy traffic, congestion and potential for collisions.	Prevention of injuries, fatalities, and damage to equipment and vehicles during the decommissioning phase.	6.4.1. Suitable parking areas should be created and designated for trucks and vehicles. 6.4.2. A supervisor should be appointed to co-ordinate the traffic during the decommissioning phase. 6.4.3. Road barricading should be undertaken where required and road safety signs should be adequately installed at strategic points within the site.	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the decommissioning phase.	Project Developer ECO and Contractor
6.5. Pollution of the surrounding groundwater as a result of spillages, generation of building rubble and	Prevent unnecessary pollution impacts on the surrounding environment.	6.5.1. The site should be cleaned regularly and all demolition waste (i.e. concrete, steel, rubble, packaging material etc.) must be removed from	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the decommissioning phase.	Project Developer, ECO and Contractor

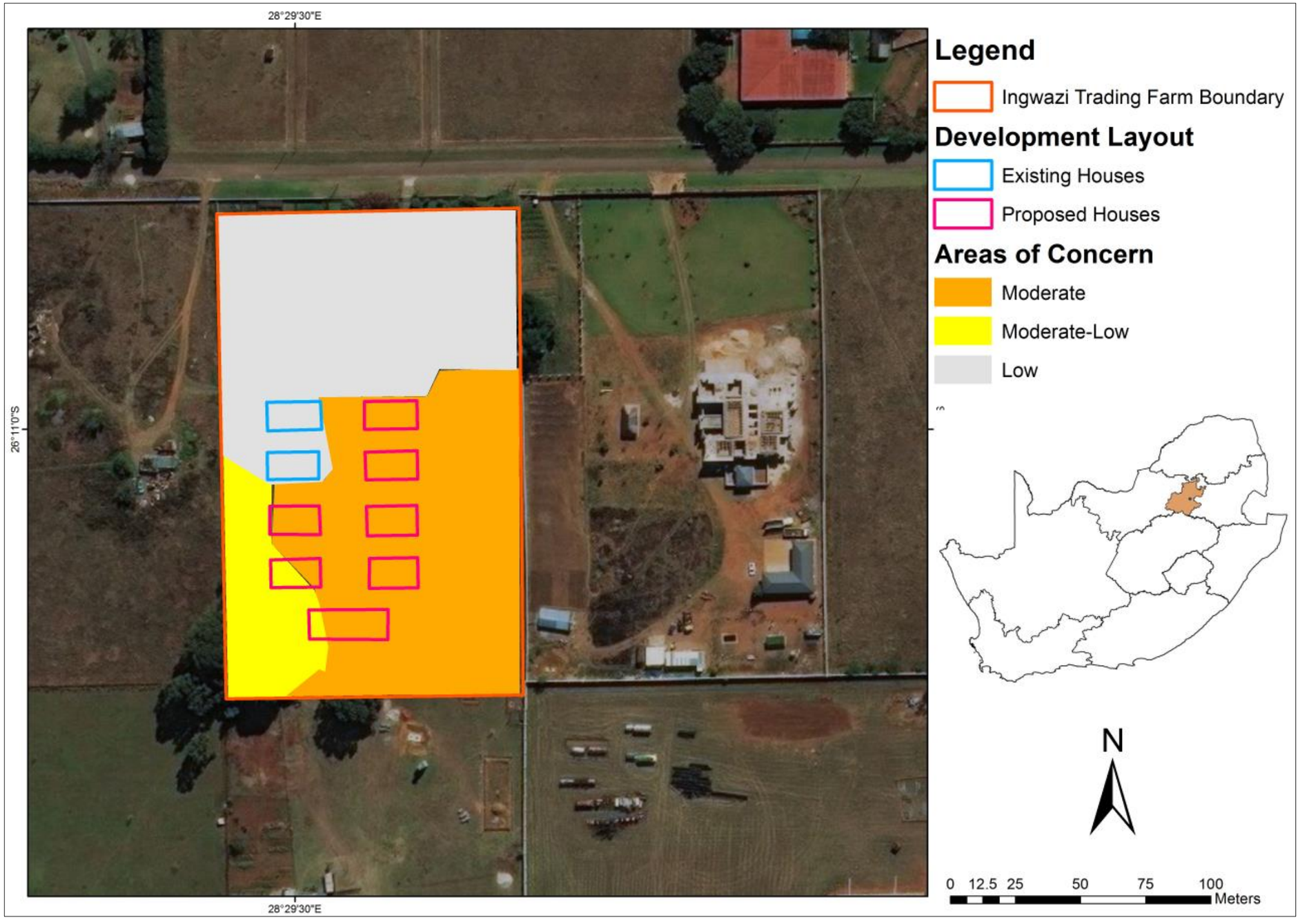
Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
waste scrap material.		site and disposed at a licenced waste disposal facility by an approved Contractor. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal. 6.5.2. All liquid wastes (i.e. used oil, paints, lubricating compounds and grease etc.) must be removed from site and disposed at a licenced hazardous waste disposal facility by an approved waste Contractor. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal.			
C. Water Conservation					
6.6. Increased water usage during the decommissioning phase.	Reduce water usage during decommissioning processes.	6.6.1. Water conservation to be practiced in line with Energy Saving Policies as follows: - Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). - Ensure that regular audits of water systems are conducted to identify possible water leakages.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO
		6.6.2. Carry out environmental	Conduct training for all	As and when	EHS Manager,

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		awareness training with a discussion on water usage and conservation.	decommissioning personnel.	necessary during decommissioning and ensure that all new staff are inducted.	ECO and Contractor
D. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
6.7. Potential spillage of effluent to the surrounding environment (from portable sanitation facilities for decommissioning personnel).	Reduce the spillage of domestic effluent and the impact thereof on the environment.	6.7.1. Ensure that normal sewage management practices are implemented during decommissioning such as regularly emptying toilets and ensuring safe transport and disposal of sewage.	EHS Manager to monitor via site audits and record non-compliance and incidents (including incidents that nearly occur).	Monthly	EHS Manager and ECO
		6.7.2. Ensure that the toilet/sanitation facilities are maintained in a clean, orderly and sanitary condition.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager and Contractor
E. Stormwater Management					
6.8. Discharge of contaminated stormwater into the surrounding environment. Contamination could result from chemicals, oils, fuels, sewage, solid waste, litter etc.	Reduce the contamination of stormwater.	6.8.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the decommissioning phase.	Compile Method Statement	Once off (and thereafter updated as required).	Contractor
		6.8.2. Provide secure storage for oil, chemicals and other waste materials in order to prevent contamination of stormwater runoff.	Monitor the bunding and containment structures.	Weekly	EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
F. Waste Management					
6.9. Pollution of the surrounding environment as a result of the handling, temporary storage and disposal of solid waste.	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	6.9.1. Carry out management actions for the decommissioning phase.	Carry out monitoring for the decommissioning phase.	Carry out monitoring for the decommissioning phase.	Project Developer and EHS Manager
G. Air Quality Management					
6.10. Air Quality Impact: Emissions from decommissioning vehicles and generation of dust as a result of earthworks and demolition	Reduce dust emissions during decommissioning activities.	6.10.1. Carry out management actions for the decommissioning phase.	Carry out monitoring for the decommissioning phase.	Carry out monitoring for the decommissioning phase.	Project Developer and EHS Manager
H. Fauna and Flora					
6.11. Introduction and proliferation of alien species	Minimize introduction and effective control of alien species	6.11.1. By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit.	Mechanical removal of these species is recommended. However, the removal must be carefully performed so as to not excessively disturb the soil layer.	Throughout the decommissioning phase.	Project Developer and EHS Manager
6.12. Sensory disturbances on Fauna	Minimise sensory disturbance surrounding faunal communities during decommissioning	6.12.1. Appropriately time demolition / rehabilitation activities to minimise sensory disturbance to fauna.	Commence (and preferably complete) demolition / rehabilitation during winter, when the risk of disturbing active (including breeding and	Throughout the decommissioning phase.	Project Developer and EHS Manager

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			migratory) animals, should be least.		

7 APPENDIX A – PROPOSED LAYOUT OF PROPOSED PROJECT OVERLAIN ON A SENSITIVITY MAP



BASIC ASSESSMENT REPORT

Appendix I: Other information

CONTENTS

I-1: CV's of the project team: Minnelise Levendal (Project Leader)

CSIR
Jan Cilliers Street
PO Box 320
Stellenbosch 7600
South Africa

Phone: +27 21 888 2400
Fax: +27 21 888 2693
Email: mlevendal@csir.co.za

CURRICULUM VITAE OF MINNELISE LEVENDAL – PROJECT LEADER

Name of firm	CSIR
Name of staff	Minnelise Levendal
Profession	Environmental Assessment and Management
Position in firm	Project Manager
Years' experience	8 years
Nationality	South African
Languages	Afrikaans and English

CONTACT DETAILS:

Postal Address:	P O Box 320, Stellenbosch, 7599
Telephone Number:	021-888 2495/2661
Cell:	0833098159
Fax:	0865051341
e-mail:	mlevendal@csir.co.za

BIOSKETCH:

Minnelise joined the CSIR Environmental Management Services group (EMS) in 2008. She is focussing primarily on managing Environmental Impact Assessments (EIAs), Basic Assessments (BAs) and Environmental Screening studies for renewable energy projects including wind and solar projects. These include an EIA for a wind energy facility near Swellendam, Western Cape South Africa for BioTherm (Authorisation granted in September 2011) and a similar EIA for BioTherm in Laingsburg, Western Cape (in progress). She is also managing two wind farm EIAs and a solar Photovoltaic BA for WKN-Windcurrent SA in the Eastern Cape. Minnelise was the project manager for the Basic Assessment for the erection of ten wind monitoring masts at different sites in South Africa as part of the national wind atlas project of the Department of Energy in 2009 and 2010..She was also a member of the Project Implementation Team who managed the drafting of South Africa's Second National Communication under the United Nations Framework Convention on Climate Change. The national Department of Environmental Affairs appointed the South African Botanical Institute (SANBI) to undertake this project. SANBI subsequently appointed the CSIR to manage this project.

EDUCATION

- M.Sc. (Botany) Stellenbosch University 1998
- B.Sc. (Hons.) (Botany) University of the Western Cape 1994
- B.Sc. (Education) University of the Western Cape 1993

MEMBERSHIPS:

- International Association for Impact Assessment (IAIA), Western Cape (member of their steering committee from 2001-2003)
- IUCN Commission on Education and Communication (CEC); World Conservation Learning Network (WCLN)
- American Association for the Advancement of Science (AAAS)
- Society of Conservation Biology (SCB)

EMPLOYMENT RECORD:

- **1995:** Peninsula Technicon. Lecturer in the Horticulture Department.
- **1996:** University of the Western Cape. Lecturer in the Botany Department.
- **1999:** University of Stellenbosch. Research assistant in the Botany Department (3 months)
- **1999:** Bengurion University (Israel). Research assistant (Working in the Arava valley, Negev – Israel; 2 months). Research undertaken was published (see first publication in publication list)
- **1999-2004:** Assistant Director at the Department of Environmental Affairs and Development Planning (DEA&DP). Work involved assessing Environmental Impact Assessments and Environmental Management Plans; promoting environmental management and sustainable development.
- **2004 to present:** Employed by the CSIR in Stellenbosch:
- September 2004 – May 2008: Biodiversity and Ecosystems Services Group (NRE)
- May 2008 to present: Environmental Management Services Group (EMS)

PROJECT EXPERIENCE RECORD:

The following table presents a list of projects undertaken at the CSIR as well as the role played in each project:

Completion Date	Project description	Role	Client
2011 *(in progress)*	EIA for the proposed Electrawinds Swartberg wind energy project near Moorreesburg in the Western Cape	Project Manager	Electrawinds
2010-2011 *(in progress)*	EIA for the proposed Ubuntu wind energy project, Eastern Cape	Project Manager	WKN Windkraft SA
2010-2011 *(in progress)*	EIA for the proposed Banna ba pifhu wind energy project, Eastern Cape	Project Manager	WKN Windkraft SA
2010-2011	BA for a powerline near Swellendam in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010-2011 *(Environmental Authorisation granted in September 2011)*	EIA for a proposed wind farm near Swellendam in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010 (complete)	Basic Assessment for the erection of two wind monitoring masts near Swellendam and Bredasdorp in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010 (complete)	Basic Assessment for the erection of two wind monitoring masts near Jeffrey's Bay in the Eastern Cape	Project Manager	Windcurrent (Pty Ltd

Completion Date	Project description	Role	Client
2009-2010 (*(Environmental Authorisations granted during 2010)*	Basic Assessment Process for the proposed erection of 10 wind monitoring masts in SA as part of the national wind atlas project	Project Manager	Department of Energy through SANERI; GEF
2010	South Africa's Second National Communication under the United Nations Framework Convention on Climate Change	Project Manager	SANBI
2009 *(Environmental Authorisation granted in 2009)*	Basic Assessment Report for a proposed boundary wall at the Port of Port Elizabeth, Eastern Cape	Project Manager	Transnet Ltd
2008	Developing an Invasive Alien Plant Strategy for the Wild Coast, Eastern Cape	Co-author	Eastern Cape Parks Board
2006-2008	Monitoring and Evaluation of aspects of Biodiversity	Project Leader	Internal project awarded through the Young Researchers Fund
2006	Integrated veldfire management in South Africa. An assessment of current conditions and future approaches.	Co- author	Working on Fire
2004-2005	Biodiversity Strategy and Action Plan Wild Coast, Eastern Cape, SA	Co-author	Wilderness Foundation
2005	Western Cape State of the Environment Report: Biodiversity section. (Year One).	Co- author and Project Manager	Department of Environmental Affairs and Development Planning

PUBLICATIONS:

Bowie, M. (née Levendal) and Ward, D. (2004). Water status of the mistletoe *Plicosepalus acaciae* parasitic on isolated Negev Desert populations of *Acacia raddiana* differing in level of mortality. Journal of Arid Environments 56: 487-508.

Wand, S.J.E., Esler, K.J. and **Bowie, M.R** (2001). Seasonal photosynthetic temperature responses and changes in ^{13}C under varying temperature regimes in leaf-succulent and drought-deciduous shrubs from the Succulent Karoo, South Africa. South African Journal of Botany 67:235-243.

Bowie, M.R., Wand, S.J.E. and Esler, K.J. (2000). Seasonal gas exchange responses under three different temperature treatments in a leaf-succulent and a drought-deciduous shrub from the Succulent Karoo. South African Journal of Botany 66:118-123.

LANGUAGES

Language	***Speaking***	***Reading***	***Writing***
English	*Excellent*	*Excellent*	*Excellent*
Afrikaans	*Excellent*	*Excellent*	*Excellent*

Minnelise Levendal

April 2018

CSIR
Jan Cilliers Street
PO Box 320
Stellenbosch 7600
South Africa

Phone: +27 21 888 2400
Fax: +27 21 888 2693
Email: *kstroebel@csir.co.za*

Curriculum Vitae of Kelly Stroebel – Project Manager/ EAP (*Cand. Sci. Nat.)*

Name of firm	CSIR
Name of staff	Kelly Stroebel
Profession	Environmental Assessment Practitioner
Position in firm	Environmental Assessment Practitioner
Years' experience	4 years
Nationality	South African

Biographical Sketch

Kelly holds a Bachelor of Science with Honours in Environmental Science from Rhodes University in Grahamstown and is currently pursuing a Masters at the University of Stellenbosch. Her undergraduate degree was a Bachelor of Science with majors in Environmental Science and Zoology. She is currently working as an environmental assessment practitioner at the Council for Scientific and Industrial Research (CSIR). Kelly has been the Project Manager of several EIA's in South Africa and several Basic Assessments for the Special Needs and Skills Development Programme. She has assisted in the SIP projects including the National Wind & Solar Strategic Environmental Assessment (SEA) and Electricity Grid Infrastructure SEA as SEA which were commissioned by the national Department of Environmental Affairs. On a personal level, Kelly enjoys the outdoors, traveling and SCUBA diving and is passionate about the field of environmental science and management.

EMPLOYMENT TRACK RECORD

The following table presents a sample of the projects that Kelly Stroebel has been involved in to this date:

Completion Date	Project description	Role	Client
In progress	**EIA's in the South African energy sector**	Project Manager/EAP	Private energy companies and organs of state
In progress	**Special Needs and Skills Development Programme (DEA-CSIR)**	Project Manager conducting Environmental services such as basic Assessments and	Various SMME's and Community Trusts

Completion Date	Project description	Role	Client
		Environmental Screening Studies.	
2015	**Strategic Environmental Assessment (SEA)** for Electricity Grid Infrastructure	Project member-stakeholder engagement and project support.	National Department of Environmental Affairs
2015	**EIA for two proposed Desalination plants on the KZN coast.**	Project member- Public Participation Process, stakeholder engagement and project support.	Umgeni Water
August 2014	**National Strategy for Sustainable Development Review (NSSD1)**	Project member- research and report development.	National Department of Environmental Affairs
2013-2014	**Strategic Environmental Assessment (SEA)** for roll out of photovoltaic solar and wind energy in South Africa.	Project member- Stakeholder engagement and project support	National Department of Environmental Affairs

EMPLOYMENT RECORD

- **2015 to present** Environmental Scientist and Assessment Practitioner. Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2014** Environmental Scientist and Assessment Practitioner (Intern). Council for Scientific and Industrial Research – Consulting and Analytical Services (CAS) - Stellenbosch
- **2013** Environmental Education Counselor - Fernwood Cove Summer Camp, USA.
- **2012** Graduate Assistant: Rhodes University Department of Environmental Science.
- **2011** Vacation Internship: Environmental Management Department of Mittal Steel, Newcastle.
- **2011** Vacation Internship: Northern Kwa-Zulu Natal branch of WWF.

QUALIFICATIONS/EDUCATION

- BSc Hons. Environmental Science (Rhodes University, Grahamstown, South Africa)
    - Honours modules including Environmental Impact Assessment, Statistics, Climate Change Adaptation, Urban Ecology and Environmental Water Quality.
    - Honours thesis: "Water use and conservation by households of different economic status in King Willliam's Town"
- Bachelor of Science with Distinction (Rhodes University, Grahamstown, South Africa)
    - Undergraduate courses including Environmental Science, Zoology, Ichthyology, Chemistry, Earth Science, Botany and Computer Science.
- IEB Matric Certificate, 5 Distinctions (St Dominic's Academy, Newcastle)

TRAINING, CONFERENCES AND PROFFESIONAL REGISTRATIONS

- Member of the Conference Organizing Committee (COC) for the IAIAsa Annual Conference 2017
- Project Management Practices and Principles with MS projects with the University of Pretoria: Distinction obtained (2016)
- Introduction to Earth Observation using ENVI with the University of Stellenbosch (2016)
- Public Participation Course with IAP2 (2016)
- Conflict Management Accredited through Conflict Dynamics (2015)
- Media and Science Training Accreditation through Jive Media Africa (2015)

- IAIA WC Workshop for Integrating Climate Change into EIA practice (2015)
- Presented on the DEA-CSIR "Special Needs and Skills Development Programme" at the 2014 & 2015 Annual IAIA (International Association for Impact Assessment) South Africa Conference.
- Environmental Impact Assessment Training Course accreditation through Coastal and Environmental Services, Grahamstown (2012)
- DEA&DP Training on the EIA Regulations (2014)
- Registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) (Reg #: 100151/14)
- Member of the South African Affiliate of the International Association for Impact Assessment (Membership no: 3588)

LANGUAGE CAPABILITY

LANGUAGES	*Speaking*	*Reading*	*Writing*
English	Excellent	Excellent	Excellent
Afrikaans	Moderate	Moderate	Moderate

I-2: EAP Declaration

THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

I, **Kelly Stroebel,** as the appointed independent environmental practitioner ("EAP") hereby declare that I:

- act/ed as the independent EAP in this application;
- regard the information contained in this report to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 49B of the Act) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the application was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments;
- have ensured that the comments of all interested and affected parties were considered, recorded and submitted to the competent authority in respect of the application;
- have kept a register of all interested and affected parties that participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 49B of the Act.

Signature of the environmental assessment practitioner:

Council for Scientific and Industrial Research (CSIR)

Name of company:

Date: