

BASIC ASSESSMENT REPORT

**DRAFT BASIC ASSESSMENT FOR THE PROPOSED
DEVELOPMENT OF A 0.6 HECTARE CHICKEN LAYER
FACILITY ON A 7.8 HECTARE FARM IN MASHAU-
BODWE VILLAGE, MAKHADO DISTRICT, LIMPOPO.**

Prepare for WANGA POULTRY FARM (Pty) Ltd

LEDET Ref Number: 12/1/9/1-V197

CSIR Reference Number: CSIR/02100/Implementation Unit/IR/2016/0005



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May 2017

Basic Assessment Process

For the proposed development of a 0.6 hectare Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

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LEDET Ref Number: 12/1/9/1-V197

CSIR Reference Number: CSIR/02100/Implementation Unit/IR/2016/0005/A

May 2017

Prepared for:

Wanga Poultry Farm (Pty) Ltd

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report details

Title:	Basic Assessment Report for the proposed development of a 0.6 hectare Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.
Purpose of this report:	<p>This Basic Assessment (BA) Report forms part of a series of reports and information sources that are being provided during the BA Process for the the development of a 0.6 ha Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.. The purpose of this BA Report is to:</p> <ul style="list-style-type: none"> • 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. <p>This BA Report is being made available to all Interested and Affected Parties (I&APs) and stakeholders for a 30-day review period. All comments submitted during the review of the BA Report will be incorporated into the finalised BA Report as applicable and where necessary. This finalised BA Report will then be submitted to the Limpopo Department of Economic Development, Environment & Tourism for decision-making.</p>
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CSIR Report Number:	CSIR/02100/Implementation Unit/IR/2016/0005/A
Date:	30 January 2016
To be cited as:	CSIR, 2016. Basic Assessment Report for the proposed development of a 0.6 hectare Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo. CSIR Reference Number: CSIR/02100/Implementation Unit/IR/2016/0005/A.

opportunity for review

Opportunity for Review:

The Draft Basic Assessment Report and Draft Environmental Management Programme (EMPr) were made available to all Interested and Affected Parties (I&APs) and stakeholders for a 30-day review period extending from 1st February 2017 to 2nd March 2017. All comments received during the review of the Draft Basic Assessment Report will be incorporated into the Final Basic Assessment Report and EMPr which will be submitted to the Limpopo Department of Economic Development, Environment & Tourism (LEDET) for decision-making.

All comments on the Draft Basic Assessment Report and Draft EMPr are to be submitted to the CSIR by 2 March 2017 at the details provided below.

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contents

1. Introduction.....	10
2. Description of the Baseline Environment.....	14
3. Public Participation.....	16
4. EAPs Recommendations.....	19

Executive Summary

The Council for Scientific and Industrial Research (CSIR), Environmental Management Services, has been appointed as the Environmental Assessment Practitioners (EAPs) to assist Wanga Poultry Farm (Pty) Ltd by conducting a Basic Assessment (BA) for their proposed chicken layer facility. This appointment is through the Department of Environmental Affairs (DEA) Special Needs and Skills Development Programme (SNSD). The SNSD aims to provide pro bono Environmental Impact Assessments (EIAs) for people who are classified as special needs clients/applicants specifically Small, Medium to Micro Enterprises (SMMEs), community trusts, individuals and some government programmes.

Wanga Poultry Farm (Pty) Ltd is proposing to establish a 0.6 hectare chicken layer facility on a 7.8 hectare property within farm Kruisfontein in Mashau Bodwe Village near Elim, Limpopo. The start-up will build three chicken houses which will have 120 000 egg-laying hens at a time. The property historically was used for minor agricultural activities, and since has been fenced off and has not been used. The proposed chicken layer facility triggered the need for an Environmental Authorisation (EA) through a Basic Assessment (BA) Process. Furthermore, the property is an area that has organisms of Conservation Importance.

The BA follows the legislative process that is prescribed in the Environmental Impact Assessment (EIA) Regulations of 2014. This report constitutes the draft consultation Basic Assessment (cBAR) that details the environmental issues and impacts associated with the development and to document the Interested and Affected Parties' (I&APs) issues and concerns. It also provides background information of the proposed project, a motivation and details of the proposed project, and describes the public participation undertaken to date.

The objective of this report is to provide the project's I&APs, stakeholders, commenting authorities and the competent authority (CA), with a thorough project description and BA process description. The outcome

of the process is to engender productive comment or input, based on all information generated to date and presented herein.

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant portions of environmental legislation that were taken into consideration during this study and are elaborated on in this report. The Limpopo Economic Development, Environment and Tourism (LEDET) is the competent authority for this BA process and the development needs to be authorised by this Department.

This draft cBAR provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed construction and operations of the egg-layer facility. Having duly considered the project, in the opinion of the Environmental Assessment Practitioner (EAP), the project does not pose a detrimental impact on the receiving environment and its inhabitants. The impacts that have been highlighted through the impact assessment can be mitigated significantly with the use of an Environmental Management Programme (EMP). The applicant should be bound to stringent conditions to maintain compliance and responsible executions of the project.

The impacts identified and assessed by way of risk ratings, have been extensively outlined in this report. The cBAR will be made available for comment and amended post comment period to form the final BAR. The final BAR will, together with a comprehensive issues trail and the final draft of the EMP, and all the addenda as referred to, will be submitted to LEDET, for decision making. The final cBAR will thus be a culmination of scientific specialist study's findings, public contribution via formal comment, and the drawing of conclusions by the EAP as the environmental specialist.

Glossary

BA	Basic Assessment
BAR	Basic Assessment Report
BEE	Black Economic Empowerment
BID	Background Information Document
CA	Competent Authority
cBAR	Consultation Basic Assessment Report
CI	Conservation Important
CSIR	Council for Scientific and Industrial Research
CV	Curriculum Vitae
DAFF	Department of Agriculture, Fisheries and Forestry
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EMS	Environmental Management Services
EO	Environmental Officer
GA	General Authorisation
GIS	Geographic Information System
GNR	Government Notice Number
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IU	Implementation Unit
LEDET	Limpopo Department of Economic Development, Environment and Tourism
MAR	Mean Annual Run-off
NBA	National Biodiversity Assessment
NBSAP	National Biodiversity Strategy and Action Plans
NEMA	National Environmental Management Act (Act No 107 of 1998)
NEM:AQA	National Environmental Management Air Quality Act (Act No 39 of 2004)
NEM:BA	National Environmental Management Biodiversity Act (Act No 10 of 2004)
NEM:PAA	National Environmental Management Protected Areas Act (Act No 57 of 2003)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFA	National Forests Act (Act No. 84 of 1998)
NGO	Non-Governmental Organisation
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NSS	Natural Scientific Services
NWA	National Water Act (Act No. 36 of 1998)
OHSA	Occupational Health and Safety Act (Act No 85 of 1993)
PES	Present Ecological State

PPE	Personnel Protective Equipment
PPP	Public Participation Process
SACNASP	South African Council of Natural Science Professionals
SAHRA	South African Heritage Resource Agency
SANRAL	South African National Roads Agency Limited
SEA	Strategic Environmental Assessment
SMME	Small, Medium to Micro Enterprise
SNSD	Special Needs and Skills Development Programme
WUL	Water Use License

Activity	An action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms 'activity' and 'development' are freely interchanged.
Alternatives	Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity. <i>Note: There are no project alternatives for this development.</i>
Applicant	The project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.
Biodiversity	The diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.
Buffer	A buffer is seen as an area that protects adjacent communities from unfavourable conditions. A buffer is usually an artificially imposed zone included in a management plan.
Construction	The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.
Cumulative Impact	The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decommissioning	The demolition of a building, facility, structure or infrastructure.
Direct Impact	Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.
Ecosystem	A dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment	<p>In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), “Environment” means the surroundings within which humans exist and that are made up of:</p> <ul style="list-style-type: none"> i. the land, water and atmosphere of the earth; ii. micro-organisms, plants and animal life; iii. any part or combination of (i) and (ii), and the interrelationships among and between them; and iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Assessment	The generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.
Environmental Authorisation	An authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.
Environmental Assessment Practitioner (EAP)	The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental

1. Introduction

1.1. Background

Wanga Poultry Farm (Pty) Ltd (hereforth Wanga Poultry) is proposing to establish a chicken layer facility in Mashau Bodwe Village near Elim, Limpopo. The property is located within farm Kruisfontein, at the following co-ordinates: (23°10'20"S; 30°11'45" E). The start-up will build three chicken houses covering 0.6 ha on a 3 hectare property. The chicken houses will have 120 000 egg laying hens at a time.

The Council for Scientific and Industrial Research (CSIR), Environmental Management Services (EMS), has been appointed as the Environmental Assessment Practitioners (EAPs) for the proposed development which will be conducting a Basic Assessment (BA). This appointment is through the Department of Environmental Affairs (DEA) Special Needs and Skills Development Programme (SNSD). The SNSD aims to provide pro bono Environmental Impact Assessments(EIAs) for people who are classified as special needs clients/applicants, specifically Small, Medium to Micro Enterprises(SMMEs), community trusts, individuals and some government programmes.

The need for a BA arises for the proposed development as it triggers listed activities in terms of the Environmental Impact Assessment (EIA) Regulations, Government Regulations (GNR) 983 and 985 of December 2014 promulgated under the National Environmental Management Act (NEMA) (Act no 107 of 1998).

Wanga Poultry has seen an opportunity in the poultry industry in Limpopo, as there has been increasing demand, which allows Wanga Poultry to realistically gain substantial milestones in the domestic market. Moreover, Wanga Poultry will provide employment to local people within Mashau-Bodwe and aims to further increase the working environment and develop young people into becoming entrepreneurs within the community through facilitating training of unskilled youth in farming.

1.2. Project Description and Development

Wanga Poultry is proposing to establish a start-up enterprise comprising of chicken houses in Mashau-Bodwe, Limpopo. The start-up plans to construct egg-layer facility that is 0.6 hectares that will enable it to produces 120 000 egg laying hens at a time. The proposed project is located on a 7.8 hectare portion of farm Kruisfontein and will contain 2 boreholes that will pump approximately 7 000 litres per day. The water will be used for commercial and domestic needs. The following is the planned development proposed by Wanga Poultry:

Construction of:

- 3 x chicken houses at 108m x 16 m each
- 4-tier laying cages
- 5 x cage rows of 103m a row
- 8000 birds per cage row (40 000 birds per house)

Additional Infrastructure:

- 1 x Egg collection System
- 1 x Manure Scrapper
- 1 x Horizontal and Elevator Manure Conveyor
- 1 x Chain Feeding System (chain provided for each tier)
- 1 x Flex Auger System
- 2 x 19 metric tonne Feeding Tanks
- Ventilation Equipment
- Electrical Component with control panel
- 1 x Curtain System of 188m x 3 m
- Water requirements will need 2 boreholes for the site.
- 1 x 20m² waste storage area.

1.3. 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 Wanga Poultry under the SNSD Programme. The CSIR identified Wanga Poultry 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.

Wanga Poultry Farm (Pty) Ltd is a 100% black owned entity supported by government funding through the Land Bank. The Land Bank offers support to previously disadvantaged individuals who do not have the startup capital to launch their own enterprise. Thus, the site which is being investigated in this report is the only site available to this entity.

1.4. Objectives of Study

The BA for Wanga Poultry aims to achieve the following:

- Conduct a consultative process
- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context.
- Describe the need and desirability of the proposed alternatives.
- Undertake an impact and risk assessment process inclusive of cumulative impacts (where applicable). The focus will include- determine the geographical, physical, and biological sensitivity of the sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to, and the degree to which these impacts

can be reversed, may cause irreplaceable loss of resources, and can be avoided, managed or mitigated.

1.5. Approach to the Study

And Application for EA will be submitted to the Limpopo Department of Economic Development, Environment and Tourism (LEDET) on the 31 January 2017.

1.5.1. Requirements for a Basic Assessment Process

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations promulgated in Government Gazette 38282 and Government Notice (GN) 982, 983, 984 and 985 on 4 December 2014, a Basic Assessment (BA) Process is required for the development of the supporting infrastructure. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting Environmental Authorisations.

The nature and extent of the proposed project is explored in more detail in this BA Report. This report has been compiled in accordance with the requirements of the EIA Regulations of December 2014 (as per the below), and includes details of the activity description; the site, area and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner (EAP).

1.5.2. Environmental Management Programme

An Environmental Management Programme report (EMPr) has been compiled according to Appendix 4 of the GNR 982 of the EIA Regulations (2014) for the construction, operational and decommissioning phases of the project.

The EMPr has been compiled as a stand-alone document from the BAR and will be submitted to the LEDET along with the BAR. The EMPr provides the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

The EMPr includes the following:

- Details of the person who prepared the EMPr and the expertise of the person to prepare an EMPr;
- Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in the BAR, including environmental impacts or objectives in respect of operation or undertaking of the activities, rehabilitation of the environment and closure where relevant;
- A detailed description of the aspects of the activity that are covered by the EMPr;

- An identification of the persons who will be responsible for the implementation of the measures;
- Where appropriate, time periods within which the measures contemplated in the EMPr must be implemented;
- Proposed mechanisms for monitoring compliance with the EMPr and reporting thereon;
- An environmental awareness plan; and
- Procedures for managing incidents which have occurred as a result of undertaking the activity and rehabilitation measures.

1.5.3. Specialist Studies

The CSIR was assisted by specialists in order to comprehensively identify potentially positive and negative environmental impacts associated with the project, and where possible to provide mitigation to reduce the potentially negative impacts and to enhance the positive impacts. Specialist input ensures the scientific vigour and a robust assessment of impacts. The specialist study that has been conducted is a Terrestrial and Freshwater Assessment conducted by Natural Scientific Services CC (NSS), Appendix D of the BAR.

1.6. Details of Environmental Assessment Practitioner and Expertise to Conduct Basic Assessment

The environmental team of Environmental Management Services (EMS), or the Council for Scientific Industrial Research (CSIR), has been appointed as the independent Environmental Assessment Practitioner (EAP) by Wanga Poultry Farm under the Special Needs & Skills Development Programme to undertake appropriate environmental studies for this proposed project.

EMS is a unit under the Implementation Unit (IU) within the CSIR. The CSIR is amongst the largest multi-disciplinary research and development organisation in Africa, which undertakes applied research and development for promoting sustainability across the continent. The organisation also provides consulting services to government, private sector, international agencies and non-governmental organisations. It is one of the leading organisations in South Africa contributing to the development and implementation of environmental assessments, ecosystem management methodologies and sustainability science. The Environmental Management Services' (EMS) vision is to assist in ensuring the sustainability of projects or plans in terms of environmental and social criteria, by providing a range of environmental services that extend across the project and planning life cycles.

The CSIR's approach builds on its experience from conducting renewable energy, industrial and port related BAs and EIAs through-out Southern Africa. We have in-depth experience in conducting BAs, EIAs and preparing EMPs in accordance with South African and international requirements. Through our involvement in BAs and EIAs undertaken in South Africa, we have extensive experience in meeting the requirements of the EIA Regulations and accompanying guidelines. We were actively engaged in commenting on the EIA Regulations under the National Environmental Management Act (NEMA) and are therefore familiar with the changes to the EIA process as it should now be conducted.

The table (**Table 1.4**) below provides contact details of EAP and supervisor for Wanga Poultry Farm's BA.

Table 1.4: CSIR EAP and supervisor's description and contact information.

Consultant	CSIR	CSIR
Contact Person	Rirhandzu Marivate (EAP)	Minnelise Levendal (EAP)
Postal Address	PO Box 320 Stellenbosch 7599	PO Box 320 Stellenbosch 7599
Telephone	021 888 2432	
Fax	021 888 2473	021 888 2473
E-mail	rmarivate@csir.co.za	mlevendal@csir.co.za
Qualifications	Bsc (Hons) Ecology, Environment and Conservation	MSc Botany
Role	Project Manager	Report Reviewer

2. Description of the Baseline Environment

2.1. Land Use

The surrounding land use comprise rural human settlement as well as communal livestock grazing and wood harvesting. The proposed development site indicates that it was previously tilled. The site has been fenced since 2002, and crop production has since ceased, and there is little evidence of surrounding land use practices. Consequently, the site vegetation has recovered well and the tree component is re-establishing.

2.2. Climate

The proposed development area falls within a warm, temperate, summer rainfall region characterised by cool, frost-free winters and hot summers. The mean annual precipitation recorded in Louis Trichardt is approximately 495 mm. The dry period generally spans from May to August, dipping in August, while the rainy season spans from December to March, peaking in January.

The temperature rarely drops below zero during winter, and the climate is moderately isothermic, varying by no more than 17 o C between monthly highs and lows in 2015-16. The maximum summer temperature is experienced from November to February with an average high of 30 o C. The lowest temperatures are experienced between May and August.

2.3. Geology and Soil

The study site falls within a geological area that supports mostly biotite gneiss and migmatite of the Goudplaats-Hout River Gneiss Suite as well as granite and syenite of the Scheil Complex (AGIS,

2014). The site is situated at the foot of a significant igneous outcrop, however, the prevailing geology is more likely to be associated with the widespread granitoid gneisses of the Goudplaats-Hout River Gneiss Suite. The rocks of this paleoarchaen intrusion are among the oldest in South Africa at approximately 2900 Ma. The likely dominant soil forms within the land type are Glenrosa (55%), Leslie (29%), Wasbank (15%) and Swartland (10%). These soils are generally sandy/gravelly and well-drained soils in this area.

2.4. Vegetation

The proposed project falls within the Savanna Biome (Rutherford & Westfall, 1986), which has the Tzaneen Sour Bushveld vegetation type (Mucina & Rutherford, 2006). The Tzaneen Sour Bushveld vegetation unit comprises of deciduous, tall open bushveld trees with well-developed, tall grass layer occurring on low to high mountains with undulating plains mainly at the base of, and on the lower to middle slopes of the northeastern escarpment. The Ecosystem

2.5. Hydrology

The site falls within the Luvuvhu and Letaba Water Management Area (WMA), the Klein Letaba Quaternary Catchment, and the Lowveld Ecoregion. The Lowveld Ecoregion is characterised by hot, dry bushveld with low to moderate relief. The Lowveld supports many large perennial rivers such as the Crocodile, Komati, Sabie, Olifants, Letaba and Levuvhu. Although none of these major rivers occur on, or adjacent to the site, a number of small tributaries surround the site with one marginally entering it in the south-eastern corner. These tributaries drain into the Klein Letaba River, which ultimately feeds the Letaba River. The proximal reach of the Klein Letaba, which is fed in part by the tributary within the study area, is classified as a Least Threatened and Well Protected Lowveld Perennial/Seasonal Lower Foothill system.

2.6. Socio Economy

Mashau- Bodwe Village falls within Makhado Local Municipality. The total populations of Makhado is estimated at 495 261 and is growing at about 1.4% per year. The area composes 54.25% female and 45.75% male. The local population has a youthful age structure and this young population will grow rapidly in future, which implies high growth rate in the labour force. At present the local economy is unable to provide sufficient employment opportunities to meet the needs of the economically active populations. A youthful populations structure also implies a relatively higher dependency ratio. The Makhado IDP (2016/17) currently estimates that only 46% of the population is currently economically active. This figure can be attributed to the high percentage of the population being under the age of 15, which makes the economically inactive.

The majority of the population lives in the rural areas. The rural areas are the most underdeveloped. The largest percentage of the rural population between the ages of 15 – 65 years comprises women. This can be attributed to the migration of men for employment opportunities elsewhere.

The Key developmental challenges faced by Makhado are that of lack of employment opportunities, because of a population growth rate that exceeds the economic growth rate. The prevalence of illegal immigration; and the lack of economic activities and investment opportunities in the area to aid the issue of employment creation.

3. Public Participation

3.1. Public Participation Process

Public participation is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinions and concerns that enable the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising the adverse effects. I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies;
- to initiate meaningful and timeous participation of I&APs;
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development (i.e. focus on important issues);
- to promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- to provide information used for decision-making;
- to provide a structure for liaison and communication with I&APs and key stakeholders;
- to ensure inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process);
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders; and
- to provide responses to I&AP queries.

The public participation process must adhere to the requirements of Regulations 41 and 42 (GNR 982) under the NEMA (as amended). In order to achieve a higher level of engagement, a number of key activities have taken place and will continue to take place. These included the following:

- The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government, to relevant structures in the non-governmental organisation (NGO) sector, to the communities of wards of residential dwellings which surround the works;
- The development of a living and dynamic database that captures details of stakeholders from all sectors;
- The fielding of queries from I&APs and others, and providing appropriate information;
- The convening of specific stakeholder groupings/forums as the need arises;
- The preparation of reports based on information gathered throughout the BA via the PPP and feeding that into the relevant decision-makers;
- The PPP includes distribution of pamphlets or Background Information Documents (BIDs) and other information packs; and
- Where appropriate site visits may be organised, as well as targeted coverage by the media.

The proposed Wanga Poultry Egg Layer production project BA PPP entails the following activities below.

3.2. Authority Consultation

The competent authority, the Limpopo Department of Economic Development, Environment and Tourism (LEDET), is required to provide an EA, positive or negative for the project.

3.3. Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders were, and will continue, to be undertaken through telephone calls and written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the BA process. Relevant key stakeholders were consulted and sent pamphlets or BIDs and other information packs (where requested). All relevant stakeholders will be allowed an opportunity to comment on the BAR.

3.4. Site Notification

The EIA Regulations (2014) require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as stakeholders and inform them of the PP Process.

The CSIR erected a site notice on the perimeter fence of the property that is along the main road, which is the most noticeable area from the property (refer to Appendix B).

3.5. Identification of Interested & Affected Parties

I&APs were identified primarily from responses received from the notices mentioned above. E-mails were sent to key stakeholders and other known I&APs, informing them of the application for the project, the availability of the BAR for review and indicating how they could become involved in the project. The contact details of all identified I&APs are updated on the project database, which is included in Appendix E. This database will be updated on an on-going basis throughout the BA process.

3.6. Briefing Paper

I&APs were identified primarily from responses received from the notices mentioned above. E-mails were sent to key stakeholders and other known I&APs, informing them of the application for the project, the availability of the BAR for review and indicating how they could become involved in the project. The contact details of all identified I&APs are updated on the project database, which is included in Appendix E. This database will be updated on an on-going basis throughout the BA process.

3.7. Advertising

In compliance with the EIA Regulations (December 2014), notification of the commencement of the BA process for the project was advertised in a local newspaper. A newspaper advert was placed in Limpopo Mirror (Refer to Appendix E).

I&APs were requested to register their interest in the project and become involved in the BA process. The primary aim of these advertisements was to ensure that the widest group of I&APs possible was informed and invited to provide input and questions and comments on the project.

3.8. Comments and Responses Report

Issues and concerns raised in the public participation process during the BA process have been and will continue to be compiled into a Comments and Responses Report. The Report is attached as Appendix E, in which all comments received and responses provided have been captured.

3.9. Public Review of the Draft Consultation BAR

The draft Consultation BAR (cBAR) will be made available for authority and public review for a total of 30 days from 02 February 2017 to 04 March 2017.

The report will be made available at the following public locations within the study area, which are all readily accessible to I&APs:

- Vhembe Public Library
- Electronically on the CSIR Website: <https://www.csir.co.za/environmental-impact-assessment>

3.10. Final Consultation BAR

The final stage in the BA process entails the capturing of responses and comments from I&APs on the cBAR in order to refine the BAR, and ensure that all issues of significance are addressed.

The final BAR (i.e. fBAR) is the product of all comments and studies, before being submitted to LEDET review and decision-making.

3.11. PPP Summary

A summary of the PPP is provided in the **Table** below, with the documents provided in **Appendix E**.

Summary of the Public Participation Process

Activity	Description
Identifying Stakeholders	Stakeholders were identified and a database of all I&APs were compiled
Publishing Newspaper Adverts	Limpopo Mirror
Distribution of a BID	BIDs were distributed electronically and by post to I&APs.
Erection of Site Notices	Two A3 site notices were erected on the perimeter of the site
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been captured in an Issues Trail.
Release of Draft Report	The draft Consultation Basic Assessment (cBAR) was advertised and made available for a period of 30 days for public review and comment from the 2 February.

Release of Final Report	The fBAR is the product of all comments and studies before being submitted to LEDET for review and decision-making. The fBAR was released on the 4 th of May 2017.
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4. EAPs Recommendations

The Department is respectfully requested to evaluate this Basic Assessment report as part of an application that has been logged in terms of section 24(1) of the National Environmental Management Act (Act 107 of 1998), in respect of the activities in regulation R982 of 04 December 2014.

Concluding statements from EAPs: Provided that the specified mitigation measures are applied effectively, it is proposed that the project receives Environmental Authorisation in terms of the EIA Regulations promulgated under the NEMA.

Rirhandzu Marivate

CSIR

PO Box 320

Stellenbosch

Tel: 021 888 2432

Fax: 021 888 2693

Email: rmarivate@csir.co.za



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

BASIC ASSESSMENT REPORT - EIA REGULATIONS, 2010

Basic Assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

File Reference Number:

--

NEAS Reference Number:

(For official use only)

Date Received:

Due date for acknowledgement:

Due date for acceptance:

Due date for decision

Kindly note that:

1. The report must be compiled by an independent Environmental Assessment Practitioner.
2. 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.
3. Where applicable **tick** the boxes that are applicable in the report.
4. 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 Department of Economic Development, Environment and Tourism as the competent authority (Department) for assessing the application, it may result in the rejection of the application as provided for in the regulations.
5. An incomplete report may be returned to the applicant for revision.
6. Unless protected by law, all information in the report will become public information on receipt by the department. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

7. The Act means the National Environmental Management Act (No. 107 of 1998) as amended.
8. Regulations refer to Environmental Impact Assessment (EIA) Regulations of 2010.
9. The Department may require that for specified types of activities in defined situations only parts of this report need to be completed. No faxed or e-mailed reports will be accepted.
10. This application form must be handed in at the offices of the Department of Economic Development, Environment and Tourism:-

<p><u>Postal Address:</u> Central Administration Office Environmental Impact Management P. O. Box 55464 POLOKWANE 0700</p>	<p><u>Physical Address:</u> Central Administration Office Environmental Affairs Building Cnr Suid and Dorp Streets POLOKWANE 0699</p>
<p>Queries should be directed to the Central Administration Office: Environmental Impact Management:-</p> <p>For attention: Mr E. V. Maluleke</p> <p>Tel: (015) 290 7138/ (015) 290 7167</p> <p>Fax: (015) 295 5015</p> <p>Email: malulekeev@ledet.gov.za</p>	

View the Department's website at [http://www.ledet.gov.za/](http://www.ledet.gov.za) for the latest version of the documents.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

NO

If YES, please complete the form entitled "Details of specialist and declaration of interest" or appointment of a specialist for each specialist thus appointed:

Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail¹:

Wanga Poultry Farm (Pty) Ltd is proposing to establish a chicken layer facility in Mashau Bodwe Village near Elim, Limpopo. The property is located within farm Kruisfontein. The start-up will build three chicken houses covering 0.6 ha on a 3 hectare property. The chicken houses will have 120 000 egg laying hens at a time. The focus of the project is to produce eggs to be sold to the local community, shops, bakeries, hospitals and hotels.

Project Details

Construction of:

- 3 x **chicken houses** at 108m x 16 m each
- 4-tier laying cages
- 5 x cage rows of 103m a row
- 8000 birds per cage row (40 000 birds per house)

Additional Infrastructure:

- 1 x Egg collection System
- 1 x Manure Scrapper
- 1 x Horizontal and Elevator Manure Conveyor
- 1 x Chain Feeding System (chain provided for each tier)
- 1 x Flex Auger System
- 2 x 19 metric tonne Feeding Tanks
- Ventilation Equipment

¹ Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

- Electrical Component with control panel
- 1 x Curtain System of 188m x 3 m
- Water requirements will need 2 boreholes for the site.
- 1 x 20 square metre waste storage area.

2. FEASIBLE AND REASONABLE ALTERNATIVES

“alternatives”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe 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 in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether 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. After receipt of this report the Department 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.

Paragraphs 3 – 13 below should be completed for each alternative.

3. 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 degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

List alternative sites, if applicable.

Latitude (S):

Longitude (E):

Alternative:

Alternative S1² (preferred or only site alternative)

23°	10'	20"	30°	11'	45"
-----	-----	-----	-----	-----	-----

² “Alternative S..” refer to site alternatives.

Alternative S2 (if any)

°	'	"	°	'	"
°	'	"	°	'	"

Alternative S3 (if any)

In the case of linear activities:

Alternative:

Latitude (S):

Longitude (E):

Alternative S1 (preferred or only route alternative)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

Alternative S2 (if any)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

Alternative S3 (if any)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

°	'	"	°	'	"
°	'	"	°	'	"
°	'	"	°	'	"

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:

Size of the activity:

Alternative A1³ (preferred activity alternative)

6000 m ²
m ²
m ²

Alternative A2 (if any)

Alternative A3 (if any)

or,

for linear activities:

³ "Alternative A.." refer to activity, process, technology or other alternatives.

Length of the activity:

Alternative:

- Alternative A1 (preferred activity alternative)
- Alternative A2 (if any)
- Alternative A3 (if any)

	m
	m
	m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Size of the site/servitude:

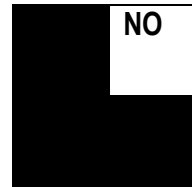
Alternative:

- Alternative A1 (preferred activity alternative)
- Alternative A2 (if any)
- Alternative A3 (if any)

	m ²
	m ²
	m ²

5. SITE ACCESS

Does ready access to the site exist?



If NO, what is the distance over which a new access road will be built

Describe the type of access road planned:

The site is located next to an established gravel road that is maintained. A gravel access road will be constructed from the gate of the farm to the chicken facilities which will be approximately 200 metres in distance. The width of the road will be approximately 5 metres.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as **Appendix A** to this document.

The site or route plans must indicate the following:

- 6.1 the scale of the plan which must be at least a scale of 1:500;
- 6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;

- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all trees and shrubs taller than 1.8 metres;
- 6.7 walls and fencing including details of the height and construction material;
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - rivers;
 - the 1:100 year flood line (where available or where it is required by Department of Water Affairs);
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or invested with alien species);
- 6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.11 the positions from where photographs of the site were taken.

7. SITE PHOTOGRAPHS

Colour photographs from the centre 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 **Appendix B** to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C 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.

11. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 12 million
What is the expected yearly income that will be generated by or as a result of the activity?	R 16 560 000
Will the activity contribute to service infrastructure?	NO
Is the activity a public amenity?	NO
How many new employment opportunities will be created in the development phase of the activity?	12
What is the expected value of the employment opportunities during the development phase?	Currently not known
What percentage of this will accrue to previously disadvantaged individuals?	100%
How many permanent new employment opportunities will be created during the operational phase of the activity?	12

What is the expected current value of the employment opportunities during the first 10 years?

Currently not known

What percentage of this will accrue to previously disadvantaged individuals?

100%

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:			
i.	Was the relevant municipality involved in the application?		NO
ii.	Does the proposed land use fall within the municipal Integrated Development Plan?	YES	
iii.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:		
	Wanga Poultry Farm is a private business venture, and all activities are the responsibility of the applicant. The tribal authority and the municipality were notified of the proposed development and they will be I&AP's during the environmental assessment process.		

DESIRABILITY:			
i.	Does the proposed land use / development fit the surrounding area?	YES	
ii.	Does the proposed land use / development conform to the relevant structure plans, Spatial development Framework, Land Use Management Scheme, and planning visions for the area?	YES	
iii.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	YES	
iv.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:		
v.	Will the proposed land use / development impact on the sense of place?		NO
vi.	Will the proposed land use / development set a precedent?		NO
vii.	Will any person's rights be affected by the proposed land use / development?		NO
viii.	Will the proposed land use / development compromise the "urban edge"?		NO
ix.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.		

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BENEFITS:		
i.	Will the land use / development have any benefits for society in general?	YES <input type="checkbox"/>
ii.	Explain: There is a large demand for egg production in South Africa. This enterprise will assist in reducing the demand as it aims to provide egg to local communities, shops, bakeries, hospitals and hotels.	
iii.	Will the land use / development have any benefits for the local communities where it will be located?	YES <input type="checkbox"/>
iv.	Explain: There is a lack of employment opportunities within the Makhado district. The egg layer facility will be an opportunity for employment for locals. In addition, the egg layer facility will provide eggs for local businesses and households at a more affordable price compares to its competitors	

10. 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, if applicable:

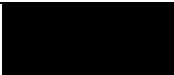
Title of legislation, policy or guideline:	Administering authority:	Date:
Constitution of South Africa (Act 108 of 1996)	National Government	1996
National Environmental Management Act (Act 107 of 1998)	LEDET	1998
National Environmental Management: Waste Act (Act 59 of 2008)	LEDET	2008
National Water Act (Act 36 of 1998)	DWA	1998
National Heritage Resources Act (Act 25 of 1999)	SAHRA	1999
National Environmental Management: Biodiversity Act (Act 10 of 2004)	LEDET	2004
Environmental Impact Assessment Regulations, 2014	LEDET	2014
National Development Plan	National Government	2012

Vhembe District Municipality IDP and SDF	Vhembe District Municipality	2015/16
Makhado Local Municipality IDP	Makhado Local Municipality	2016/17

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	
Not able to predict at this stage of the project	

If yes, what estimated quantity will be produced per month?

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

The solid waste will be transported by truck that has weather and scavenger proof containers to a waste transfer station in Vuwani.

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

The waste will be sent to Vuwani Waste Transfer Station, which will then be transported to the Makhado Town waste management site as per the municipal waste management system.

Will the activity produce solid waste during its operational phase?
If yes, what estimated quantity will be produced per month?

YES	
6 tonnes	

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

The waste will be stored in 12kgs bags, waste will be a mixture of saw dust and chicken faeces (9 tonnes per cycle; 1.5 tonnes per week; 6 tonnes per months)

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

The waste will be stored on an onsite waste storage facility and will be sold to local farmers as crop fertilizer.


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, then the applicant should consult with the department 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 department 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, then the applicant should consult with the Department to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

	NO
--	----

If yes, what estimated quantity will be produced per month?

--	--

Will the activity produce any effluent that will be treated and/or disposed of on site?

	NO
--	----

If yes, the applicant should consult with the Department 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?

	NO
--	----

If yes, provide the particulars of the facility:

Facility name:

Contact person:

Postal address:

Postal code:

Telephone:

Cell:

E-mail:

Fax:

--	--	--

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

--

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

YES	
-----	--

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:

The air emissions generated by the chicken layer facility do not require an Air Emissions License as per NEM:AQA (Act No 39 of 2004). The relevant impacts of these odours have been assessed in the Impact Assessment Section (Section D).

11(d) Generation of noise

Will the activity generate noise?

YES	
-----	--

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 noise in terms of type and level:

--

The noise generated by the chicken layer facility does not require an Air Emissions License as per NEM:AQA (Act No 39 of 2004). The relevant impact for the noise generated has been assessed in the Impact Assessment Section (Section D).

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

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:

200 000 Litres

Does the activity require a water use permit from the Department of Water Affairs?

NO

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

13. 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 will make use of solar PV powered pumps, thus lessening the energy requirements.

Office buildings and Chicken facilities:

- Use of building material originating from sensitive environmental resources should be minimized.
- 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, change 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:

As above.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases

please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. [REDACTED]
(e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? [REDACTED]

NO

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

Property description/physical address:

Erf No: 976 on farm Kruisfontein

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

--

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:

The property was previously used for agriculture. But activities ceased in 2002, and thus reverting to its indigenous vegetation. The land is therefore zoned as virgin land.
--

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required?

[REDACTED]	NO
------------	----

Must a building plan be submitted to the local authority?

YES	[REDACTED]
-----	------------

Locality map:

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (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 map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (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 degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

	1:15 – 1:10	
--	-------------	--

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------	-------------	-------------	--------------	-------------	------------------

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5
------	-------------	-------------	-------------	--------------	-------------	------------------

2. LOCATION IN LANDSCAPE

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

2.1 Ridgeline		2.6 Plain	
2.2 Plateau		2.7 Undulating plain / low hills	
2.3 Side slope of hill/mountain	x	2.8 Dune	
2.4 Closed valley		2.9 Seafront	
2.5 Open valley			

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:	Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	NO	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	NO	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	NO	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	NO	YES	NO	YES	NO
Any other unstable soil or geological feature	NO	YES	NO	YES	NO
An area sensitive to erosion	NO	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

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

Natural veld - good condition ^E	Natural veld with scattered aliens ^E	
--	---	--

If any of the boxes marked with an “E” is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn’t have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area	x	5.22 School	
5.2 Low density residential	x	5.23 Tertiary education facility	
5.3 Medium density residential		5.24 Church	
5.4 High density residential		5.25 Old age home	
5.5 Medium industrial ^{AN}		5.26 Museum	
5.6 Office/consulting room		5.27 Historical building	
5.7 Military or police base/station/compound		5.28 Protected Area	
5.8 Spoil heap or slimes dam ^A		5.29 Sewage treatment plant ^A	
5.9 Light industrial		5.30 Train station or shunting yard ^N	
5.10 Heavy industrial ^{AN}		5.31 Railway line ^N	
5.11 Power station		5.32 Major road (4 lanes or more)	
5.12 Sport facilities		5.33 Airport ^N	
5.13 Golf course		5.34 Harbour	
5.14 Polo fields		5.35 Quarry, sand or borrow pit	
5.15 Filling station ^H		5.36 Hospital/medical centre	
5.16 Landfill or waste treatment site		5.37 River, stream or wetland	
5.17 Plantation	x	5.38 Nature conservation area	
5.18 Agriculture	x	5.39 Mountain, koppie or ridge	x
5.19 Archaeological site		5.40 Graveyard	
5.20 Quarry, sand or borrow pit		5.41 River, stream or wetland	
5.21 Dam or Reservoir		5.42 Other land uses (describe)	

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity?



If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?

If YES, specify and explain:	
If NO, specify:	

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:	
If NO, specify:	

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally 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? NO

If YES, explain:

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:	SAHRA, Archaeology, Palaeontology and Meteorites Unit has exempted a Heritage Impact Assessment, as the area has been disturbed previously and the level of change on the landscape by the proposed development is low. The development is in an area where potential for uncovering fossiliferous rock is negligible.
	Should there be any new discovered heritage resources during construction and operation phases of the proposed development, that prove to be of archaeological or palaeontological significance, a need for a Phase 2 rescue operation will be necessary and a permit will be required before mitigation can be carried out.

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)? NO

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the department) at a place conspicuous to the public at the boundary or on the fence of—

- (i) the site where the activity to which the application relates is or is to be undertaken; and
- (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the department;
- (c) placing an advertisement in—
 - (i) one local newspaper; or
 - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the department, in those instances where a person is desiring of but unable to participate in the process due to—
 - (i) illiteracy;
 - (ii) disability; or
 - (iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
 - (i) that the application has been submitted to the department in terms of these Regulations, as the case may be;
 - (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;

- (iii) the nature and location of the activity to which the application relates;
- (iv) where further information on the application or activity can be obtained; and
- (v) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the department in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of these Regulations.

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation 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, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the department to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in these Regulations and be attached to this application. The comments and response report must be attached under Appendix E.

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

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.

Name of Authority informed:	Comments received (Yes or No)
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LEDET	Yes
DOA	No
DCGHSTA	No
Vhembe District Municipality	No
Makhado Local Municipality	No
DEA	No
DRDLR	No
SANParks	No
DAFF	No
SAHRA	No
SANRAL	Yes

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the department.

Proof of any such agreement must be provided, where applicable.

Has any comment been received from stakeholders?

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

The issues/ comments that were raised by Interested and Affected Parties following the release of the Background Information Document and prior to the release of this Draft Basic Assessment Report can be seen in the comments and responses report with is attached as Appendix E.

The Comments and Response Report (CRR) following the release of the Draft Basic Assessment Report will form part of the Final BAR.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, 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.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

The issues/ comments that were raised by Interested and Affected Parties following the release of the Background Information Document and prior to the release of this Draft Basic Assessment Report can be seen in the comments and responses report with is attached as Appendix E.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

The property was previously used for agriculture. But activities ceased in 2002, and thus reverting to its indigenous vegetation. The land is therefore zoned as **virgin** land.

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

ENVIRONMENTAL IMPACT DETERMINATION AND EVALUATION

Impact assessment must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance is provided in this Section. The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects.

The environmental Impact Assessment is focussed on the following phases:

- Construction Phase
- Operational Phase
- Decommissioning Phase

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.

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:

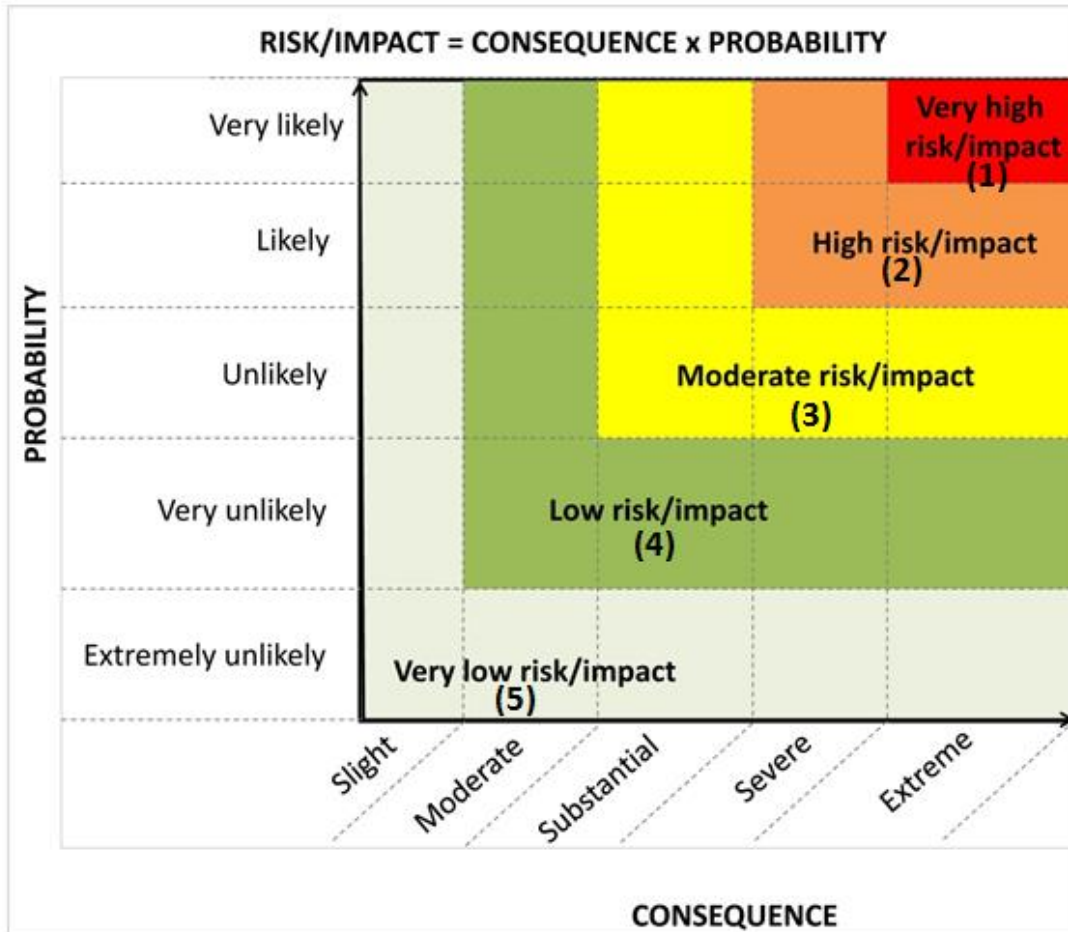
- Improbable (little or no chance of occurring);
- Probable (<50% chance of occurring);
- Highly probable (50 – 90% chance of occurring); or
- Definite (>90% chance of occurring).

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).



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.

Description and ratings of different Impact Criteria [Rating (Score)]

Criteria	Description				
Nature (A brief written statement of the environment aspect being impacted upon by a particular activity or action.)	<i>Direct</i>	<i>Indirect</i>	<i>Cumulative</i>		
Status (The perceived effect of the impact on the affected area.)	<i>Negative</i>	<i>Positive</i>	<i>Neutral</i>		
Spatial Extent	<i>National (4):</i> The Whole of South Africa	<i>Regional (3):</i> Provincial and Parts of neighbouring provinces	<i>Local (2):</i> Within a radius of 2 km of the construction site	<i>Site (1):</i> Within the construction site	
Duration	<i>Permanent:</i> This impact is irreversible. Mitigation will not occur in such a way Or in such a time span that the impact can be considered transient.	<i>Long term (>15 years):</i> The impacts will cease after the operational life of the activity. The impact is reversible with the implementation of appropriate mitigation and management actions.	<i>Medium Term (6 to 15 years):</i> The impact is reversible with the implementation of appropriate mitigation and management actions.	<i>Short term (2 to 6 years):</i> This impact is reversible.	<i>Temporary (less than 2 years):</i> or period of the construction period. The impact is fully reversible.
Potential Impact Intensity (Negative)	<i>Very High/Fatal Flaw (16):</i> Potential to severely impact human health, or lead to loss of species	<i>High (8):</i> potential to reduce fauna/flora population or to lead to severe reduction/alteration of natural process, loss of livelihood/severe impact on quality of life, individual economic loss	<i>Medium (4):</i> Potential to reduce environmental quality; air, soil, water. Potential loss of habitat, loss of heritage, reduce amenity	<i>Medium-Low (2):</i> Nuisance	<i>Low (1):</i> Negative change, with no other consequence
Potential Impact Intensity (Positive)	<i>High (8):</i> Potential Net improvement in human welfare	<i>Medium (4):</i> Potential to improve environmental quality; air, soil, water. Improved livelihoods	<i>Medium-Low(2):</i> Potential to lead to Economic Development	<i>Low (1):</i> Potential positive change- with no other consequences	
Reversibility	<i>Irreversible</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	
Irreplaceability of Impact Resource	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Replaceable</i>	
Probability	<i>Definite (1):</i> >90% chance of occurring	<i>Highly Probable (0.5):</i> 50-90% chance of occurring	<i>Probable (0.25):</i> 10-25% chance of occurring	<i>Improbable (0.1):</i> Little or no chance of occurring < 10%	
Rating of Overall Impact Significance	Fatally flawed (18-26): The project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating	High (10-17): The impacts will result in major alterations to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making.	Medium (5-9): 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	Low (<5): The Impact may result in moderate alteration of the environment and can be reduced or avoided by implementing appropriate mitigation measures, and will not have an influence of decision-making.	

Overall impact significance is calculated as:

Impact significance = Impact magnitude X Impact probability, where:

Impact magnitude = Potential impact intensity + Impact Duration + Impact extent

The suitability and feasibility of all the proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measures is implemented. Mitigation measures identified as necessary will be included in an EMP.

Potential Impacts and Significance

The following sections will provide a description of the potential impacts as identified by the specialists, EAP and through the PPP as well as the assessment according to the criteria described in the above table. All potential impacts associated with the proposed development through the construction, operation and decommissioning of the development life-cycle have been considered and assessed in the following sections.

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

Alternative (preferred alternative)

Construction Phase			
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:			
<ul style="list-style-type: none"> Loss of seep and deterioration of downstream wetland drivers from construction of chicken facility and from increased erosion 	High (Negative)	<ul style="list-style-type: none"> Re-align the proposed layout of infrastructure so that it avoids the wetland and wetland buffer, specifically the water reservoir Re-align the proposed layout of infrastructure northwards 	Low (Negative)
<ul style="list-style-type: none"> Introduction & proliferation of alien spp. From the influx of vehicles, people and materials, site disturbance and lack 	Medium (Negative)	<ul style="list-style-type: none"> By law, remove and dispose of Category 1b alien species on site. Mechanical removal of these species is recommended. However, the removal must be carefully performed so as to not excessively disturb the soil layer. Alien debris could be donated to a local 	Low(Negative)

of alien species control		community. All Category 2 species that remain on site must require a permit.	
<ul style="list-style-type: none"> ▪ Unnatural wild fires from influx of people and construction activities 	Low (Negative)	<ul style="list-style-type: none"> ▪ Highlight all prohibited activities to workers through training and notices. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Loss if terrestrial vegetation and faunal habitat, specifically the secondary woodland areas and <i>Hyperthelia</i> grassland, from construction of chicken facility 	Medium (Negative)	<ul style="list-style-type: none"> ▪ Restrict all clearing of vegetation and disturbance of habitat from construction activities to the final infrastructure footprint. ▪ Maintain the viability of the indigenous seed bank in excavated soil so that it can be used for subsequent re-vegetation of any disturbed areas. No landscaping should be performed around the facilities. ▪ Avoid unnecessary loss of indigenous trees, specifically <i>Morula</i> and <i>Ficus</i> species as well and faunal habitat such as termitaria. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Loss of vegetation communities and Conservation Important(CI) species from clearing of vegetation and increase in vehicle and human activity 	Medium (Negative)	<ul style="list-style-type: none"> ▪ Highlight all prohibited activities to workers through training and notices. ▪ Briefly and effectively stockpile topsoil (preferably 1-1.5m in height) to maintain the viability of the indigenous seed bank for subsequent re-vegetation of any disturbed areas. ▪ No landscaping should be performed around the facilities. A large number of poultry production facilities in South Africa have expansive lawns around their developments. This must be avoided. Natural vegetation must be allowed to recover in areas of disturbance. If recovery is slow, then a seed mix for the area (using indigenous grass species listed within this report) should be sourced and planted. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Increase in dust and erosion from clearing of vegetation, earth moving activities, and increase in vehicle traffic 	Low (Negative)	<ul style="list-style-type: none"> ▪ Erosion protection measures must be implemented on the site to reduce erosion and sedimentation of the receiving environment. Measures could include: <ul style="list-style-type: none"> ○ Sandbags; ○ Sediment traps; ○ Bunding around soil stockpiles; ○ Vegetation of areas not to be developed. ▪ Adequate dust control strategies should be applied to minimise dust deposition, for example: <ul style="list-style-type: none"> ○ Periodic spraying of roads with water. ○ Cover trucks to prevent dust emission during transport. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Environmental contamination from 	Medium	<ul style="list-style-type: none"> ▪ Regularly check vehicles, machinery and equipment operating on site to ensure that 	Low (Negative)

<p>building rubble, chemical leaks, spills and emissions, human excrement and litter</p>	<p>(Negative)</p>	<p>none have leaks or cause spills of oil, diesel, grease or hydraulic fluid. Should a hydrocarbon or other chemical spill occur, clean up procedures must be undertaken a.s.a.p., in line with best practice:</p> <ul style="list-style-type: none"> ○ Spills on soil should be contained by using oil absorbents and/or peat sorbs to absorb the spill. This should be cleaned and removed into adequate hazardous waste containers. All contaminated soil must be removed and placed into hazardous waste bins or should be bio-remediate. ○ Spills on water must be addressed by personnel on site or by pollution control contractors, using oil absorbents or oil skimmers. Oil contaminated absorbent material or skimmed-off chemicals need to be disposed of in hazardous waste bins or sealable drums. ○ Under no circumstances must spilled products be disposed of in sewers or storm water drains, or be deliberately ignited. ○ Gloves/PPE should be worn when handling spilled petroleum products. 	
<ul style="list-style-type: none"> ▪ Disturbance of CI fauna from habitat destruction, increase in vehicle and human activity, noise and dust, environmental contamination, and unnatural fires 	<p>Medium(Negative)</p>	<ul style="list-style-type: none"> ▪ Highlight all prohibited activities to workers through training and notices. ▪ Commence (and preferably complete) construction during winter, when the risk of erosion, disturbing growing plants, and disturbing active (including breeding and migratory) animals, should be least. Although grass-owls can breed throughout the year, egg-laying has NOT been recorded in June, August and September ▪ Noise should also be minimised throughout construction to limit the impact on sensitive fauna such as owls, korhaans and Secretary bird. ▪ Limit construction activities to day light hours, and minimize security and other lights at night, to reduce the disturbance of nocturnal fauna including CI species such the potentially occurring Serval, hedgehog, Cape Fox and grass-owls. ▪ Check open trenches daily for trapped animals (e.g. bullfrogs, hedgehogs and snakes), which should be carefully caught and relocated according to the specifications of a relevant specialist. 	<p>Low (Negative)</p>
<ul style="list-style-type: none"> ▪ Air Quality Impact: 	<p>Medium</p>	<ul style="list-style-type: none"> ▪ Ensure that cleared (excavated) areas and 	<p>Low (Negative)</p>

<p>Emissions from construction vehicles and generation of dust as a result of earthworks, demolition, as well as the delivery and mixing of construction materials.</p>	<p>(Negative)</p>	<p>unpaved surfaces are sprayed with water (obtained from an approved source) to minimise dust generation.</p> <ul style="list-style-type: none"> ▪ 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 ▪ 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 ▪ Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least. ▪ Noise should also be minimised throughout construction to limit the impact on sensitive fauna such as owls and large terrestrial birds such as Korhaans and Secretary birds. ▪ Limit construction activities to day time hours. 	
<ul style="list-style-type: none"> ▪ Potential visual intrusion of construction/demolition activities on the views of sensitive visual receptors. 	<p>Low (Negative)</p>	<ul style="list-style-type: none"> ▪ No specific mitigation measures are required other than standard construction site housekeeping and dust suppression. These are included below: <ul style="list-style-type: none"> ○ 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. 	<p>Low (Negative)</p>
<ul style="list-style-type: none"> ▪ Potential noise impact from the use of construction equipment (for the 	<p>Low (Negative)</p>	<ul style="list-style-type: none"> ▪ Limit construction activities to day time hours 	<p>Low (Negative)</p>

construction of the proposed infrastructure and demolition of existing infrastructure).			
<ul style="list-style-type: none"> 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 (Neutral)	<ul style="list-style-type: none"> Construction personnel must wear proper hearing protection, which should be specified as part of the Construction Phase Risk Assessment carried out by the Ensure construction personnel are provided with adequate Personal Protective Equipment (PPE), where appropriate. 	Low (Neutral)
<ul style="list-style-type: none"> Traffic, congestion and potential for collisions during the construction phase. This impact is rated as neutral. 	Low (Neutral)	<ul style="list-style-type: none"> 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 (Neutral)
<ul style="list-style-type: none"> Potential impact on the safety of construction workers due to construction activities (such as welding, cutting, working at heights, lifting of heavy items etc.). This impact is rated as neutral. 	High (Neutral)	<ul style="list-style-type: none"> Ensure that a skilled and competent Contractor is appointed during the construction phase. The Contractor must be evaluated during the tender/appointment process in terms of safety standards. The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate. The Contractor must undertake a Construction Phase Risk Assessment. A Construction Site Manager or Safety Supervisor should be appointed, in conjunction with the project manager, to monitor all safety aspects during the construction phase. This could be the same person that is assigned to co-ordinate the construction traffic. Ensure that roads are not closed during construction, which may restrict access for emergency services. 	Medium (Neutral)
<ul style="list-style-type: none"> Potential health injuries to construction personnel as a result 	Medium (Neutral)	<ul style="list-style-type: none"> The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate. 	Low (Neutral)

of construction work (i.e. welding fumes. This impact is rated as neutral.			
<ul style="list-style-type: none"> Disturbance of Heritage Resources from construction activities. 	Low (Negative)	<ul style="list-style-type: none"> The buildings found on site, although old have minimal heritage value. Buildings with heritage significance or pre-1945 should not be altered in the construction of this project 	Negligible
<ul style="list-style-type: none"> Socio-economic Impact: Employment creation and skills development opportunities during the construction phase, which is expected to give rise to approximately 10 new jobs. This impact is rated as positive. 	Medium (Positive)	<ul style="list-style-type: none"> 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. 	High (Positive)
Indirect impacts:			
<ul style="list-style-type: none"> Socio-economic impact: Secondary industries may benefit from the proposed project in the form of the provision of produce and pork products. This impact is rated as positive. 	Low (Positive)	<ul style="list-style-type: none"> Ensure that local industries are utilised as suppliers, where applicable/practical. 	Medium (Positive)

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.
- Customers of the proposed chicken egg-layer 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 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.

Operational Phase

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:			
<ul style="list-style-type: none"> ▪ Environmental contamination from chicken excrement, carcasses and feed, and other operational waste 	High (Negative)	<ul style="list-style-type: none"> ▪ Dispose of animal feed, bedding, excrement, carcasses, and all other waste using effective and environmentally-friendly methods, as planned pre-construction. Under no circumstances should carcasses or any other waste be dumped on site, or elsewhere, where this is not catered for. ▪ Implement procedures and measures (e.g. sand traps) to prohibit accidental dirty water or contamination from entering the surrounding environment. ▪ Immediately implement effective measures to rehabilitate accidentally contaminated areas. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Transmission of diseases of wildlife from poultry and pets 	High (Negative)	<ul style="list-style-type: none"> ▪ Implement procedures and measures (e.g. sand traps) to prohibit accidental dirty water or contamination from entering the surrounding environment. ▪ Immediately implement effective measures to rehabilitate accidentally contaminated areas. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Poor/Inappropriate control of invertebrate pests such as flies, weavils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc. 	Medium (Negative)	<ul style="list-style-type: none"> ▪ It is hard to overemphasize the importance of detecting pest infestations before they become a problem. Failure to do so will often result in increased cost of control, less effective or ineffective control measures and significant damage or loss. Proper detection requires frequent and careful monitoring, a knowledge of the common pests and an ability to recognize potential problems. To prevent pests, the following should be performed: 	Low (Negative)

		<ul style="list-style-type: none"> ▪ Remove all trash, and sources of feed and water for pests from the outside perimeter of the facilities. ▪ Moisture management, sanitation and manure removal are the keys to reducing pest problems in manure. Dry manure reduces the suitability for fly oviposition (egg laying) and larval development. It also provides a suitable habitat for beneficial predators and parasites. ▪ For fly management: Electrocutation devices are available to kill flies, while other mechanical devices include traps, sticky tapes or baited traps. 	
<ul style="list-style-type: none"> ▪ Poor/Inappropriate control of vertebrate pests such as rodents, snakes mammalian carnivores, bats and raptors 	<p>Medium (Negative)</p>	<ul style="list-style-type: none"> ▪ It is hard to overemphasize the importance of detecting pest infestations before they become a problem. Failure to do so will often result in increased cost of control, less effective or ineffective control measures and significant damage or loss. Proper detection requires frequent and careful monitoring, a knowledge of the common pests and an ability to recognize potential problems. To prevent pests, the following should be performed: <ul style="list-style-type: none"> ○ 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 and hiding places for rats and mice. Plug all holes in the building (other than air inlets) larger than 1cm to prevent mice and rats from entering. Seal all foundation cracks. Check to see that fan louvers are properly working and close completely when the fan is not running. ○ In terms of rodent control: sanitation, rodent proofing and rodent killing are effective. Sanitation is removing the food, water and shelter from the rats and mice. Rodent proofing is making it more difficult for rodents to enter the building by sealing or covering with wire mesh, all holes and cracks in the walls and foundations, around water pipes and drain spouts. Rodent killing is the third element of the program and a variety of methods can be used. Glue boards and traps can be used in small areas, but in larger areas (over 12,000 sq ft) baits are more practical. Rodenticides are NOT advised. ○ The most effective control for indigenous birds is screening production house air 	<p>Low (Negative)</p>

		inlets and open windows with 2x2cm wire mesh.	
<ul style="list-style-type: none"> Harvesting of CI flora, such as medicinal plants, from increase in human activity 	Low (Negative)	<ul style="list-style-type: none"> Highlight all prohibited activities to workers through training and notices. 	Low (Negative)
<ul style="list-style-type: none"> Unnatural wild fires to reduce risks to human and infrastructure safety, and from increase in human activity 	Medium (Negative)	<ul style="list-style-type: none"> Highlight all prohibited activities to workers through training and notices. 	Low (Negative)
<ul style="list-style-type: none"> Introduction and proliferation of alien spp. From influx of vehicles, people and materials, site disturbance, and lack of alien species control 	High (Negative)	<ul style="list-style-type: none"> Effectively remove remaining and emerging alien and invasive flora. Any alien debris could be donated to a local community. 	Low (Negative)
<ul style="list-style-type: none"> Disturbance of CI fauna from vehicle and human activity, noise and light, environmental contamination, inappropriate pest management, disease transmission, proliferation of alien species, and unnatural fires. 	Medium (Negative)	<ul style="list-style-type: none"> Highlight all prohibited activities to workers through training and notices. Implement measures (e.g. speed bumps) along the gravel access to control dust, erosion, sedimentation, and faunal roadkill and any sensory disturbance. Minimize lighting. Where this is not possible, lights should be hooded and orientated downwards to reduce the disturbance or attraction of fauna to lights. Fluorescent and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible. 	Low (Negative)
<ul style="list-style-type: none"> Air Quality Impact: Increased odours resulting from chicken facility. 	High (Negative)	<ul style="list-style-type: none"> 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)
<ul style="list-style-type: none"> Air Quality Impact: Emissions from staff vehicles. 	Low (Negative)	<ul style="list-style-type: none"> Efficient movement of traffic through the entrance and exit in order to reduce congestion and vehicle emissions. Ensure that the facility is operated in such a manner whereby potential odours are minimised. 	Low (Negative)
<ul style="list-style-type: none"> Potential visual intrusion of structures and buildings associated with the proposed development on existing views of sensitive visual 	Low (Neutral)	<ul style="list-style-type: none"> No specific mitigation measures are recommended. 	Low (Neutral)

receptors. This impact is rated as neutral.			
<ul style="list-style-type: none"> ▪ Potential impact of night lighting of the development on the nightscape of the surrounding landscape. This impact is rated as neutral. 	Low (Neutral)	<ul style="list-style-type: none"> ▪ No specific mitigation measures are recommended as it is assumed that night lighting of the proposed storage facility will be planned in such a manner so as to minimize light pollution such as glare and light spill (light trespass) by: <ul style="list-style-type: none"> ○ Using light fixtures that shield the light and focus illumination on the ground (or only where light is required). ○ Using minimum lamp wattage within safety/security requirements. ○ Avoiding elevated lights within safety/security requirements. ○ Where possible, using timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements). ○ Switching off lights when not in use in line with safety and security. 	Low (Neutral)
<ul style="list-style-type: none"> ▪ Potential noise impact from operations and road transport of products during the operational phase (i.e. increased road traffic). 	Low (Negative)	<ul style="list-style-type: none"> ▪ It is recommended that the drivers of the vehicles be discouraged from using air brakes at night. ▪ Limit the effects of noise associated disturbances from chickens and operational activities on sensitive fauna such as owls and medium-large mammals (especially carnivores), potentially occurring hedgehogs and large terrestrial birds such as Korhaans and Secretarybirds. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Atmospheric pollution due to fumes, smoke from fires (involving plant and vegetable oils or MEG). This impact is rated as neutral. 	Medium (Neutral)	<ul style="list-style-type: none"> ▪ Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the terminal as required. Mobile fire-fighting equipment should be provided at the berths as a safety precaution during the vessel offloading process. It should be noted that the products planned to be stored at the terminal have high flash points and low volatility. As a result, fires are unlikely, unsustainable, and can be extinguished with basic fire water and portable fire extinguishers. 	Low (Neutral)
<ul style="list-style-type: none"> ▪ Land contamination as a result of storage of chicken waste on the proposed waste storage facility 	Medium (Negative)	<ul style="list-style-type: none"> ▪ The waste storage facility must be operated within its design capacity. ▪ Ensure that the waste storage facility is free from odour or emissions at levels that are likely to cause annoyance. ▪ Personnel should ensure careful transportation of waste from the chicken facilities to the 	Low (Negative)

		<p>storage facility as to avoid spillage.</p> <ul style="list-style-type: none"> Training must be provided continuously to all employees working with waste and all contract workers that might be exposed to waste. 	
<ul style="list-style-type: none"> Disturbance of Heritage Resources from operational activities. 	Low (Negative)	<ul style="list-style-type: none"> The buildings found on site, although old have minimal heritage value. Buildings with heritage significance or pre-1945 should not be altered in the operation of this project 	Negligible
<ul style="list-style-type: none"> Potential impact on the health of operating personnel resulting in potential health injuries. This impact is rated as neutral. 	Medium (Neutral)	<ul style="list-style-type: none"> Operational personnel must wear basic PPE (e.g. gloves, goggles etc.) as necessary during the operational phase. 	Low (Neutral)
<ul style="list-style-type: none"> Minor accidents to the public and moderate accidents to operational staff (e.g. fires). This impact is rated as neutral. 	Medium (Neutral)	<ul style="list-style-type: none"> 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, piping and waste storage facility. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the facility as required. 	Low (Neutral)
<ul style="list-style-type: none"> Impact of extra operational vehicles on the road network. 	Low (Negative)	<ul style="list-style-type: none"> Undertake re-calibration of existing traffic signals if required. 	Low (Negative)
<ul style="list-style-type: none"> Improved service delivery with regards to produce. This impact is rated as positive. 	Medium (Positive)	<ul style="list-style-type: none"> 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. 	High (Positive)
<ul style="list-style-type: none"> Socio-economic Impact: Skills development opportunities and economic spin off activities will also occur during the operational phase. This impact is rated as positive. 	Medium (Positive)	<ul style="list-style-type: none"> 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)
<i>Indirect impacts:</i>			
<ul style="list-style-type: none"> Socio-economic impact: Secondary industries may benefit from the proposed project in 	Low (Positive)	<ul style="list-style-type: none"> Ensure that local industries are utilised as suppliers, where applicable/practical. 	Medium (Positive)

the form of the provision of produce and pork products. This impact is rated as positive.			
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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.
- Customers of the proposed chicken egg-layer 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 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.

Decommissioning Phase

IDENTIFIED IMPACTS- DECOMMISSIONING AND CLOSURE PHASE			
IMPACT	SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION
ALTERNATIVE A1 (PREFERRED ALTERNATIVE)			
Direct impacts:			
<ul style="list-style-type: none"> ▪ Increase in dust and erosion from demolishing and rehabilitation activities 	Low (Negative)	<ul style="list-style-type: none"> ▪ Erosion protection measures must be implemented on the site to reduce erosion and sedimentation of the receiving environment, as previously described. ▪ Adequate dust control strategies should be applied to minimise dust deposition, as previously described. 	Low (Negative)
<ul style="list-style-type: none"> ▪ Environmental Contamination from building rubble, chicken excrement, 	High (Negative)	<ul style="list-style-type: none"> ▪ Devise effective and environmentally-friendly means of managing all waste on site, where this cannot be disposed of using an appropriate licensed facility. Leftover 	Low (Negative)

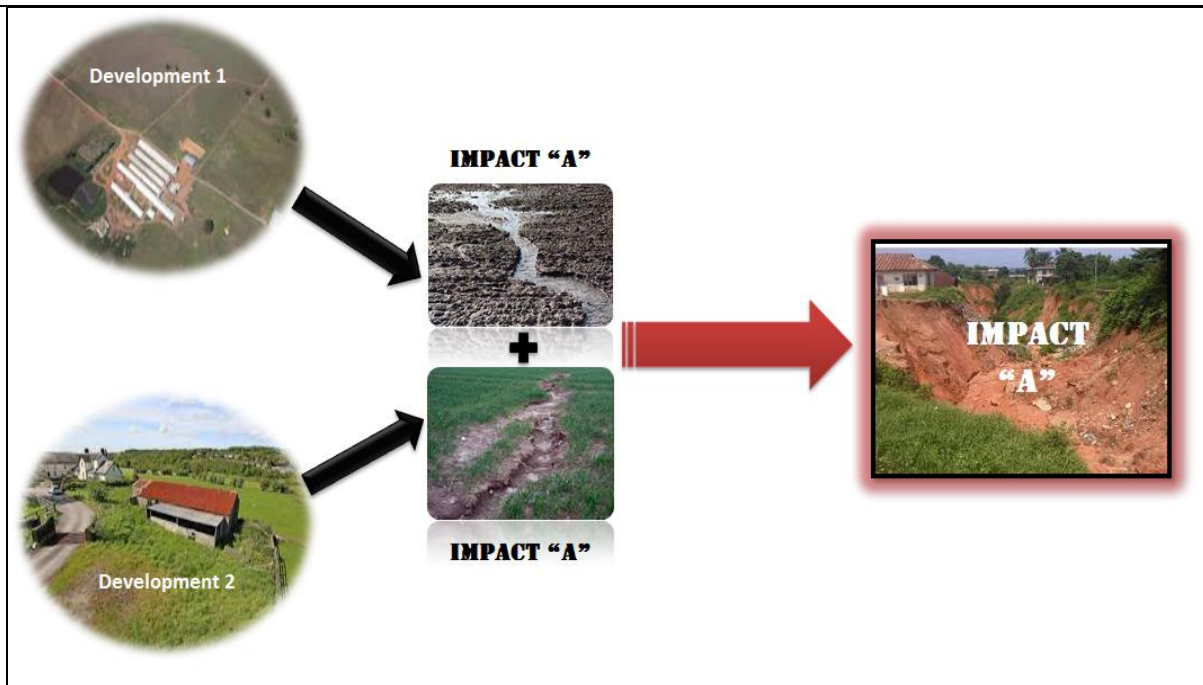
carcasses and feed, other operational waste, chemical leaks, spills and emissions, and litter		<p>animal feed, excrement, carcasses, dirty water, building rubble and any other waste should be prohibited from entering the surrounding environment.</p> <ul style="list-style-type: none"> Regularly check vehicles, machinery and equipment operating on site to ensure that none have leaks or cause spills of oil, diesel, grease or hydraulic fluid. Should a hydrocarbon or other chemical spill occur, clean up procedures must be undertaken a.s.a.p., in line with best practice, as previously described. 	
<ul style="list-style-type: none"> Unnatural wild fires from influx of people and decommissioning activities 	Low (Negative)	<ul style="list-style-type: none"> Highlight all prohibited activities to workers through training and notices. 	Low (Negative)
<ul style="list-style-type: none"> Introduction and proliferation of alien spp. From influx of vehicles, people and materials, site disturbance, and lack of alien species control 	High (Negative)	<ul style="list-style-type: none"> Remove and dispose of any remaining and emerging Category 1b and Category 2 alien species on site. Again, alien debris could be donated to a local community. Enable natural vegetation to recover in areas of disturbance. If recovery is slow, then a seed mix for the area (using indigenous grass species listed within this report) should be sourced and planted. 	Low (Negative)
<ul style="list-style-type: none"> Deterioration of downstream wetland drivers (increased erosion and run-off) from possible demolition and landscaping activities 	Medium (Negative)	<ul style="list-style-type: none"> Ensure that building rubble and other waste 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. 	Low (Negative)
<ul style="list-style-type: none"> Disturbance of CI fauna from increase in vehicle and human activity, noise and dust, environmental contamination, unnatural fires, and proliferation of alien species 	Low (Negative)	<ul style="list-style-type: none"> Highlight all prohibited activities to workers through training and notices. Demarcate the decommissioning site to prevent surrounding areas and biodiversity from being disturbed or destroyed. Disturbance of the wetland and rocky grassland areas, in particular, must be prohibited. Commence (and preferably complete) decommissioning during winter, when the risk of erosion, disturbing growing plants, and disturbing active (including breeding and migratory) animals, should be least. Noise should also be minimised throughout decommissioning to limit the impact on sensitive fauna such as owls, korhaans and Secretary bird. Limit decommissioning activities to day 	Low (Negative)

		light hours, and minimize security and other lights at night, to reduce the disturbance of nocturnal fauna including CI species.	
<ul style="list-style-type: none"> ▪ Air Quality Impact: Emissions from decommissioning vehicles and generation of dust as a result of earthworks and demolition. 	Low (Negative)	<ul style="list-style-type: none"> ▪ 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)
<ul style="list-style-type: none"> ▪ Potential visual intrusion of decommissioning activities on the existing views of sensitive visual receptors. 	Low (Negative)	<ul style="list-style-type: none"> ▪ No specific mitigation measures are required other than standard site housekeeping and dust suppression. These are included below: <ul style="list-style-type: none"> ○ 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. ▪ Limit the effects of light pollution on nocturnal fauna (e.g. The potentially occurring Hedgehog and Rusty Pipistrelle but also various invertebrate species) 	Low (Negative)
<ul style="list-style-type: none"> ▪ Disturbance of Heritage Resources from decommissioning activities. 	Low (Negative)	<ul style="list-style-type: none"> ▪ The buildings found on site, although old have minimal heritage value. ▪ Buildings with heritage significance or pre-1945 should not be altered in the decommissioning and closure of this project 	Negligible
<ul style="list-style-type: none"> ▪ Noise generation from demolition activities (e.g. grinding, steel falling, use of angle grinders) during the decommissioning 	Medium (Neutral)	<ul style="list-style-type: none"> ▪ A method statement, including detailed procedures, must be drawn up prior to any decommissioning of existing tanks. ▪ Decommissioning personnel must wear proper hearing protection, which should be specified as part of the Decommissioning Phase Risk Assessment carried out by the 	Low (Neutral)

phase. This impact is rated as neutral.		Contractor. <ul style="list-style-type: none"> The Contractor must ensure that all decommissioning personnel are provided with adequate PPE, where appropriate. 	
<ul style="list-style-type: none"> Demolition safety injuries. This impact is rated as neutral. 	High (Neutral)	<ul style="list-style-type: none"> Ensure that a skilled and competent Contractor is appointed. The Contractor must be evaluated during the tender/appointment process in terms of safety standards. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE for use where appropriate. The Contractor must undertake a Decommissioning Phase Risk Assessment. A Site Manager or Safety Supervisor should be appointed, in conjunction with the project manager, to monitor all safety aspects during the decommissioning phase. This could be the same person that is assigned to co-ordinate the decommissioning traffic. 	Medium (Neutral)
Indirect impacts:			
<ul style="list-style-type: none"> Loss of Jobs and Income for workers 	High (Negative)	<ul style="list-style-type: none"> Ensure that workers/employees obtain agricultural training and management skills that are marketable in order for them to be able to use their skills in finding other opportunities. Establish a relationship with local economic development and chambers of commerce and other employment initiatives in order to create a platform that assists in helping workers transition to other employment or entrepreneurial opportunities. 	Medium (Negative)

Cumulative impacts:

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



Schematic diagram indicating an example of a cumulative impact

IDENTIFIED IMPACTS- CONSTRUCTION PHASE			
IMPACT	SIGNIFICANCE RATING OF IMPACT BEFORE MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE RATING OF IMPACT AFTER MITIGATION
ALTERNATIVE A1 (PREFERRED ALTERNATIVE)			
<ul style="list-style-type: none"> Impact of extra operational vehicles on the road network. 	Low (Negative)	<ul style="list-style-type: none"> Undertake –recalibration of existing traffic signals if required. 	Low (Negative)
<ul style="list-style-type: none"> Decrease in fauna and flora due to increased foot traffic during operations of the developments. 	Low (Negative)	<ul style="list-style-type: none"> Ensure that only designated footpaths are used during activity. Limit activities to during day hours for nocturnal fauna. Continue to highlight prohibited activities to workers through continuous training. 	Low (Negative)
<ul style="list-style-type: none"> Reduction of water availability because of increased abstraction from ground and surface water resources. 	Medium (Negative)	<ul style="list-style-type: none"> Water conservation should still be practices during the operational phase. Borehole abstraction devices and water tanks for storage should be inspected regularly so as to insure that there are no leakages. 	Low (Negative)
<ul style="list-style-type: none"> Increased job opportunities and boosting of local economic development in the area. 	Medium (Positive)	<ul style="list-style-type: none"> No mitigation measures are identified 	Medium (Positive)
<ul style="list-style-type: none"> Secondary industries may benefit from the proposed project in the form of the provision of poultry eggs. 	Low (Positive)	<ul style="list-style-type: none"> Ensure that local industries are utilised as suppliers, where applicable/practical. 	Medium (Positive)

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity 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.

Alternative A (preferred alternative)

The proposed development of a chicken egg-layer facility and its associated infrastructure will have some impact on the environment. The findings of the Impact Assessment will see some loss of fauna and flora, and some water resources. Other impacts are the potential air emissions, visual and noise impacts from the construction, operations and decommissioning of the project. Furthermore, many of the impacts are medium to low in the current environment and with the recommended mitigation measures the proposed development will have overall low-impacts of the environment.

The Ecological Scan found that Conservation Important habitats and species were found but would only be only mildly threatened by the proposed development, if it adheres by the guidelines outlined in the EMPr. However, the drainage system that flows through the south-eastern corner of the site will need to be protected from disturbance.

Since freshwater features were identified within the 500m zone of regulation according to Regulation GN1199 (draft regulation GN1180) of the proposed infrastructure, either a Water Use Licence (WUL) or a General Authorisation in terms of Section 21 (c) and (i) may be required, depending on the exact locality and nature of the proposed activities. However, this should be clarified with the relevant DWS officials.

The proposed chicken egg-layer facility also has a positive impact in the region's economy. The proposed development can potentially have a strong impact on local industries if they provide eggs and other related products locally. The proposed development further has the opportunity for skills development and economic opportunities for its employees during its operations.

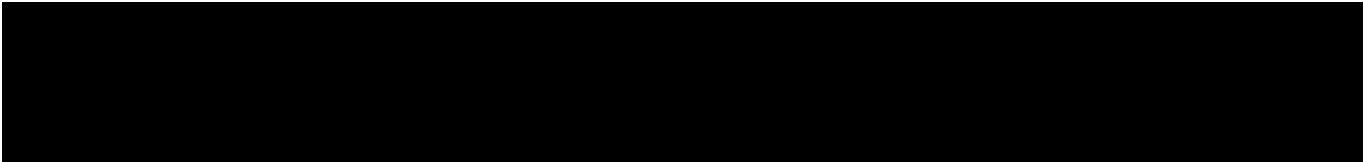
No substantial negative impacts have been identified that, in the opinion of the Environmental Practitioner, should be considered as "fatal flaws" from the environmental perspective, and thereby necessitate substantial re-design or termination of the project. Based on the findings of this Basic Assessment, it is the opinion of the EAP that the project benefits outweigh the negative environmental impacts, and that the project will make a positive contribution to steering South Africa forward. Provided that the specific mitigation measures are applied effectively, it is proposed that the project receive environmental authorisation in terms of the EIA Regulations promulgated under the National Environmental Management Act (NEMA), (2014).

Furthermore, in order to avoid and/or manage the potential negative impacts, and enhance the benefits, an Environmental Management Programme (EMPr) has been compiled. The EMPr is a dynamic document that should be updated regularly and provide clear and implementable measures for the establishment and operation of the chicken egg-layer facility.

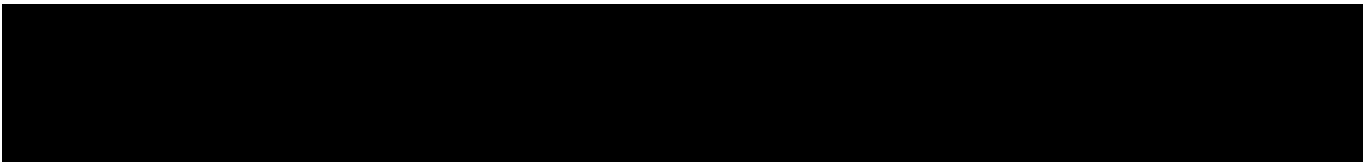
No-go alternative (compulsory)

This option assumes that a conservative approach would ensure that the environment is not impacted upon anymore that is currently the case. It is important to state that this assessment is informed by the current conditions 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.

Alternative B



Alternative C



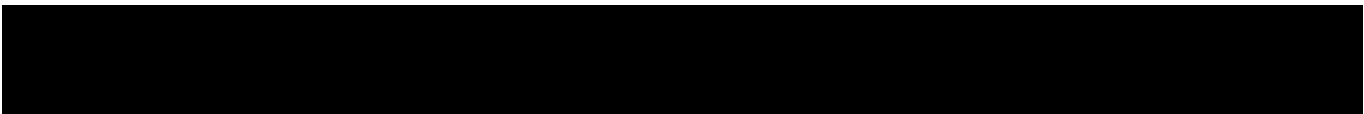
For more alternatives please continue as alternative D, E, etc.

SECTION E. RECOMMENDATION OF 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)?

YES	
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If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):



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 department in respect of the application:

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 such as owls and medium-large mammals (especially carnivores), potentially occurring hedgehogs and large terrestrial birds such as korhaans and Secretarybirds.
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. If any herpetological species are encountered or exposed during the construction phase, they should be removed and relocated to natural areas in the vicinity. This remediation requires the employment of a herpetologist to oversee the removal of any herpetofauna during the initial ground-clearing phase of construction.
14. Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
15. 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.
16. 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)
17. All mitigation measures listed in the BAR as well as the EMPr must be implemented and adhered to. .
18. Mitigation measures and strict waste management should ensure the prevention of contamination on site.
19. The Use of a borehole for water supply must be registered with the Department of Water and Sanitation.

Is an EMPr attached?

The EMPr must be attached as Appendix F.

YES

SECTION F: APPENDIXES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

LEDET BA Report, EIA 2010: Project Name: _____

Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

SECTION G: DECLARATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

I, _____ declare that I –

- (a) act as the independent environmental practitioner in this application;
- (b) do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2010;
- (c) do not have and will not have a vested interest in the proposed activity proceeding;
- (d) have no, and will not engage in, conflicting interests in the undertaking of the activity;
- (e) undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2006;
- (f) will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- (g) will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the Department in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the Department may be attached to the report without further amendment to the report;
- (h) will keep a register of all interested and affected parties that participated in a public participation process; and
- (i) will provide the Department with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Signature of the Environmental Assessment Practitioner:

Name of company:

Date:

APPENDICES

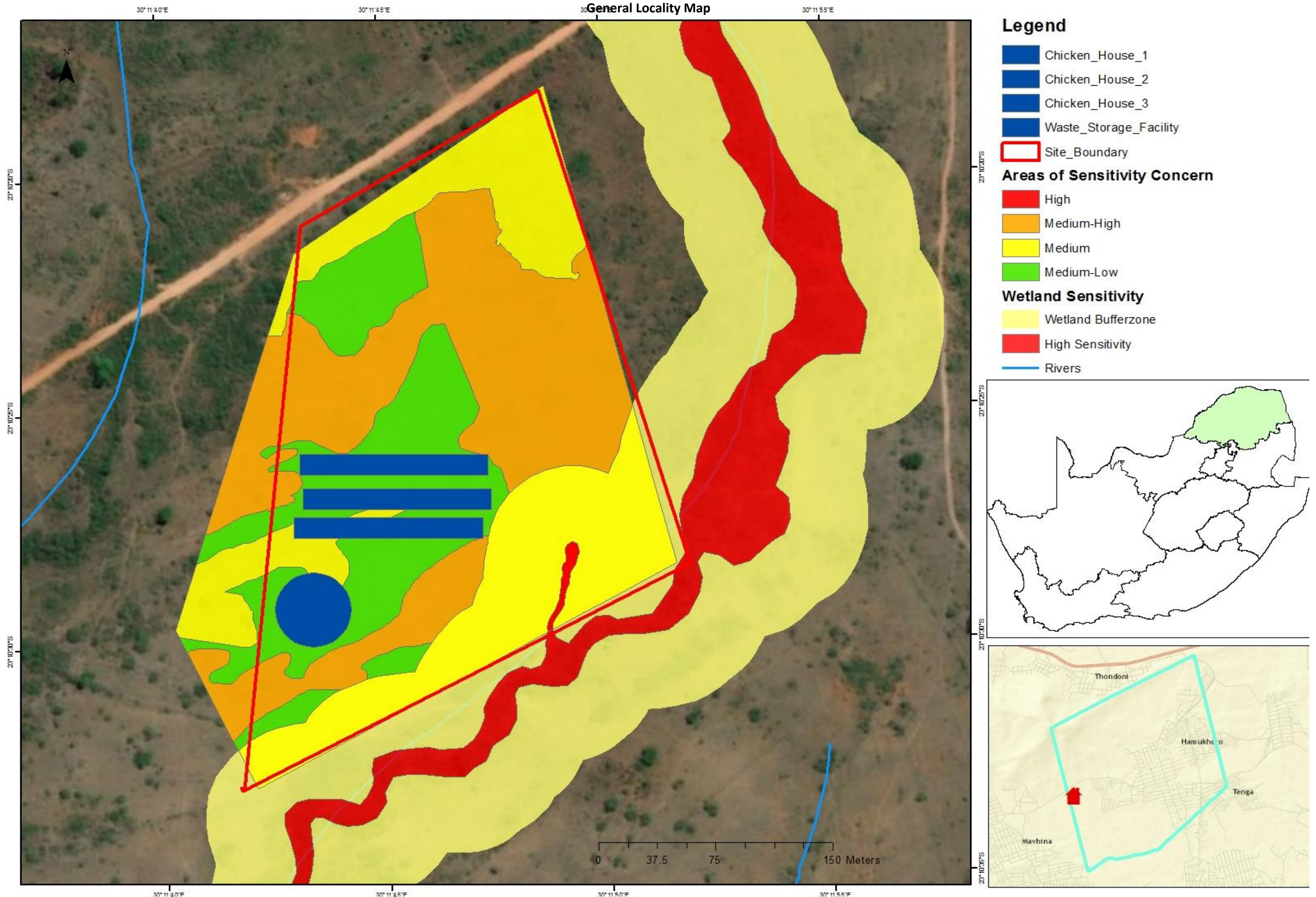
Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX A: Site Plan(s)



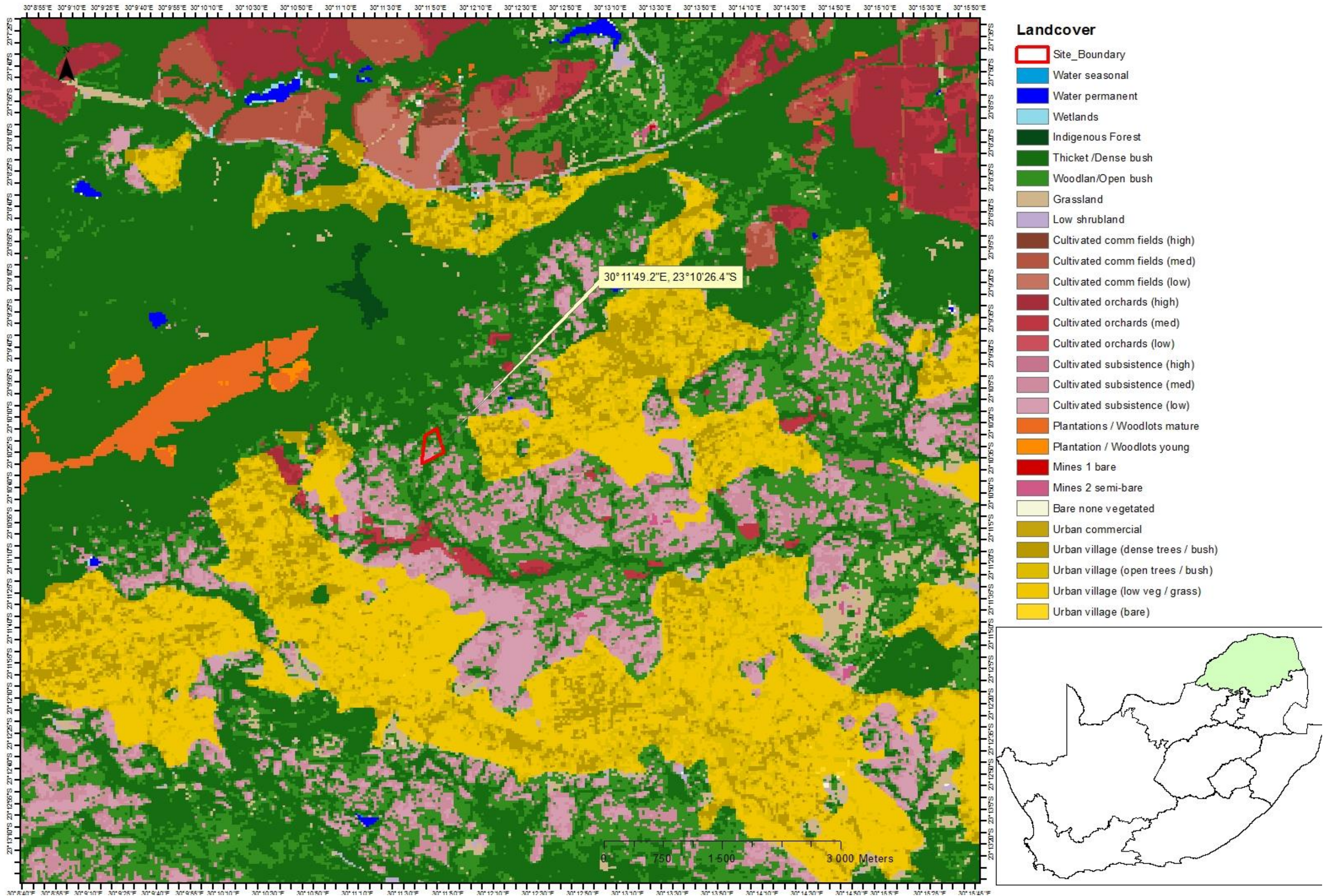
APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

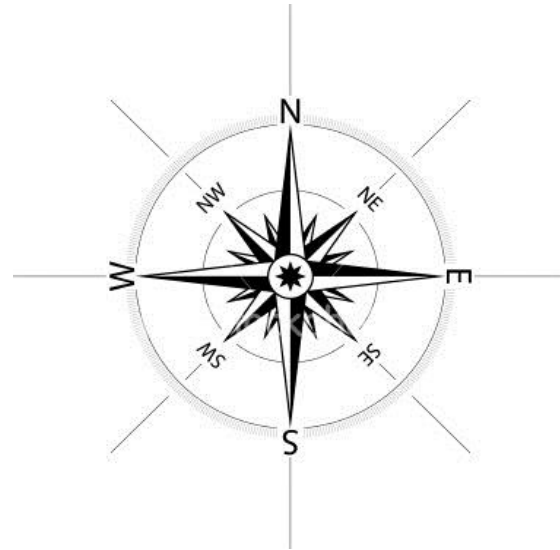
APPENDIX B: Photographs



Basic Assessment for the development of a 0.6 hect

3 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Site Photographs



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX C: Facility Illustration(s)



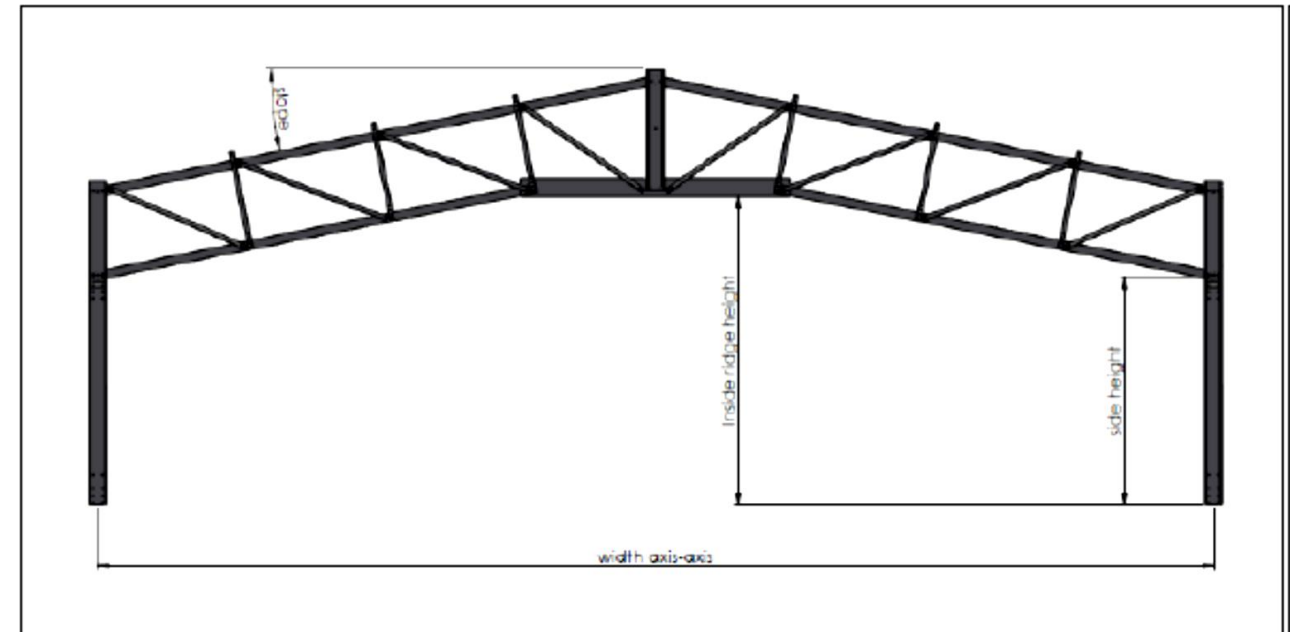
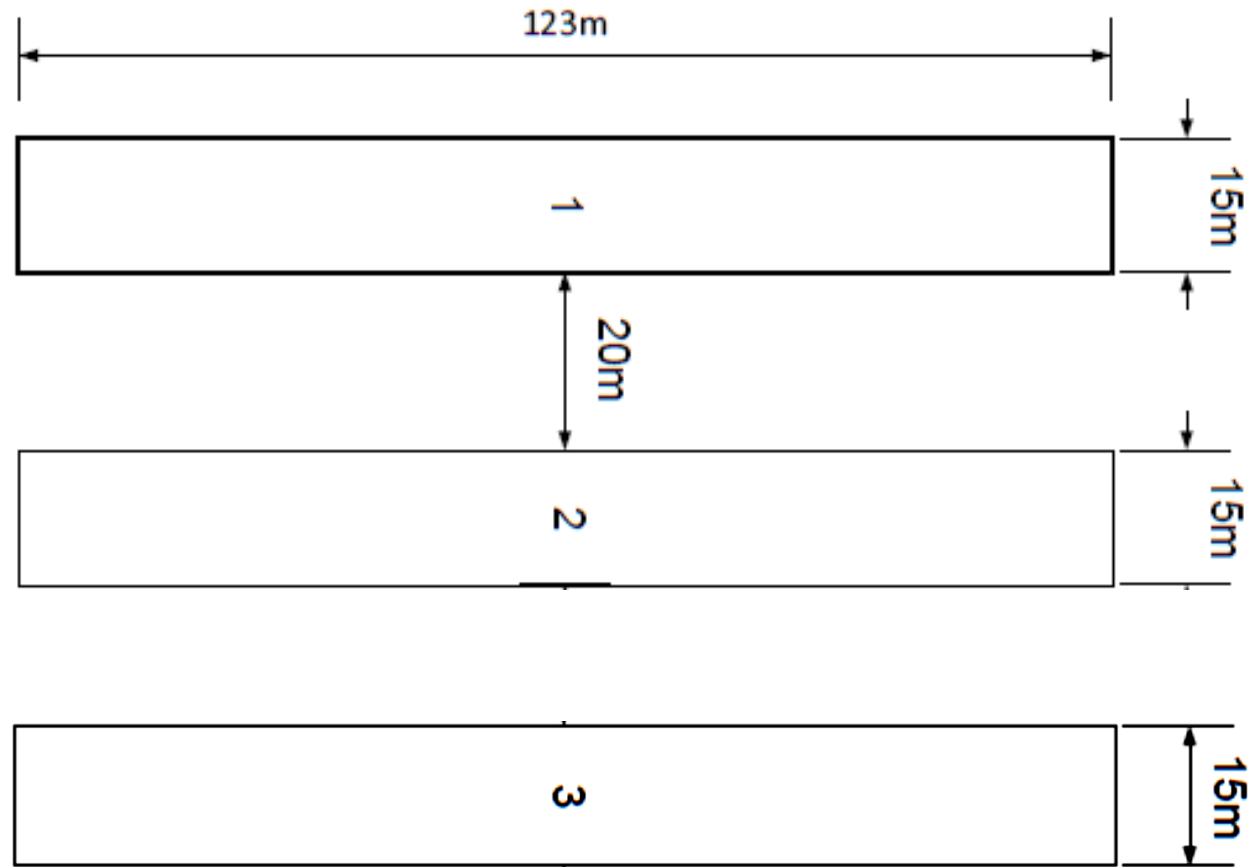
APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Measurements to be determined at a later stage

Chicken Layer Facility Illustration

Workers Canteen	Workers Showers & Change Room	Administration Office & Kitchen	Electricity Standby Generator
--------------------	-------------------------------------	------------------------------------	-------------------------------------



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX D: Specialist Report





ECOLOGICAL OPINION/SCAN

FOR A PROPOSED CHICKEN LAYER FACILITY IN MASHAU – BODWE VILLAGE,
MAKHADO DISTRICT , LIMPOPO



Compiled By:

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NSS Ref No: 2287
Date: August 2016

All pictures taken on site

ECOLOGICAL OPINION/SCAN FOR A PROPOSED CHICKEN LAYER FACILITY IN MASHAU-BODWE VILLAGE, MAKHADO DISTRICT, LIMPOPO

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Ref No: 2287
Date: August 2016



EXECUTIVE SUMMARY

Natural Scientific Services CC was approached by the Council for Scientific and Industrial Research to perform a terrestrial ecoscan (a brief floral and faunal assessment) for a proposed small-scale poultry production facility (referred to as Mashau Bodwe Chicken Facility) in the Mashau Bodwe Village near Elim in Limpopo Province.

Desktop research and findings from a field survey in July 2016 indicated that much of the study site has been subject to past tilling, and currently comprises regenerated grassland and secondary woodland. A small wetland area (drainage line), which originates in, and exits the south-eastern corner of the site, is regarded as a significant in situ feature connecting to the main system which runs parallel to the southern and eastern boundaries of the site. The drainage line continues downstream in a south-westerly direction, and eventually feeds into the Klein (Little) Letaba River. In addition to this unit, there are pockets of Primary open woodland that still exist on the property that yield large mature Marulas (*Sclerocarya birrea* subsp. *caffra*), Coral and Ficus trees. The Marulas are protected under national law (National Forest Act, 1998) and therefore would require permits for removal. A number of potentially occurring CI faunal species were rated with (at best) a moderate likelihood of occurrence on site. Of these, the globally Endangered Northern Forest Rain Frog and the globally Vulnerable Soutpansberg Worm Lizard are considered most vulnerable to disturbance from the proposed development.

Summarized in the **Table** below are potential impacts of the proposed project on biodiversity, without and with mitigation. Without mitigation, the most significant potential impacts include:

- The potential loss of a portion of the seep from the construction of the reservoir.
- Disturbance of the in situ wetland and downstream drainage system due to construction of infrastructure, potential erosion and increase in sediment loads, operational activities that would attribute to poor waste management and accidental spills.
- As the site contains limited alien invasives, the introduction of alien flora with the influx of vehicles, people, and construction and operation materials, and their proliferation in the absence of effective control measures would be significant.
- Loss or displacement of CI species due to habitat destruction or degradation, increased traffic and human activity, and disturbance from noise, light and dust pollution.
- Poor or inappropriate control of invertebrate and vertebrate pest species due to substandard animal husbandry / hygiene and waste management.

Table Summary of impact significance, without and with mitigation

POTENTIAL IMPACTS	SIGNIFICANCE	
	Without mitigation	With mitigation
CONSTRUCTION		
<i>Loss of seep, and deterioration of downstream wetland drivers</i>	High	Low
<i>Loss of terrestrial vegetation and faunal habitat</i>	Medium	Low
<i>Loss of CI or medicinal flora</i>	Medium	Low



POTENTIAL IMPACTS	SIGNIFICANCE	
<i>Loss of CI fauna</i>	Medium	Low
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Sensory disturbance of fauna</i>	Medium	Low
OPERATION		
<i>Environmental contamination</i>	High	Low
<i>Poor / Inappropriate control of animal pests</i>	High	Low
<i>Disease transmission</i>	Medium	Low
<i>Altered burning</i>	Medium	Low
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Loss of CI or medicinal flora</i>	Low	Low
<i>Sensory disturbance of fauna</i>	Medium	Low
DECOMMISSIONING		
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Deterioration of downstream wetland drivers (increased erosion and run-off)</i>	Medium	Low
<i>Sensory disturbance of fauna</i>	Low	Low

Two main areas will need to be avoided and the infrastructure repositioned. The Primary Woodland and associated mature trees as well as the seep and associated buffer. Currently the reservoir is positioned within the seep and buffer zone. If the developer would like to develop on this area, a water use licence will be required. With the re-alignment of the infrastructure and the implementation of the mitigation measures suggested in this report, the significance of impacts on site can be reduced to **Low**. Based on our site visit and the information that was available to date, it is NSS's opinion that there are no fatal flaws to the project. If the recommended mitigation measures are implemented, NSS has no objection to the project going forward.

DECLARATION

I, Susan Abell, 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.



Susan Abell Pr.Sci.Nat.
SACNASP Reg. No. 400116/05
(Ecological & Environmental Science)

30/08/2016
Date

TABLE OF CONTENTS

1. Introduction.....	6
2. Terms of Reference	1
3. Project Team	1
4. Applicable Legislation.....	2
4.1. International Agreements	2
4.2. International Policies and Agreements	2
4.3. Regional Agreements	2
4.4. National Legislation.....	3
4.5. National Policies, Guidelines & Programmes	3
4.6. Provincial Legislation, Policies & Guidelines	3
5. Study Site Description.....	4
5.1. Location and land use.....	4
5.2. Climate	5
5.3. Geology and soils	6
5.4. Vegetation.....	7
5.5. Hydrology	8
6. Methodology	12
6.1. Vegetation & Floral Communities.....	12
6.2. Fauna	14
6.3. Impact Assessment.....	16
7. Results	18
7.1. Vegetation Structure	18
7.2. Faunal Communities	33
8. Areas of Significance	41
8.1. International Areas of Conservation Significance	41
8.2. National and Regional Areas of Conservation Significance	41
8.3. Local Areas of Conservation Significance	42
9. Impact Assessment & Recommendations	49
9.1. Impacts.....	49
9.2. Management and Mitigation Recommendations	51
10. Concluding Remarks	52
11. References	60
12. Appendices	63
12.1. Mammal list for study area	63
12.2. Bird list for study area	66
12.3. Reptile list for study area.....	74

12.4. Frog list for study area	78
12.5. Butterfly list for study area.....	79
12.6. Odonata list for study area	87
12.7. Scorpion list for study area.....	88
12.8. CVs of Specialists	89

LIST OF TABLES

Table 3-1	Project team with associated areas of specialisation	2
Table 5-1	Soil forms, their wetland potential, coverage, and erodibility classes within the terrain units of land type Bd48	7
Table 5-2	Important plant species in the Tzaneen Sour Bushveld vegetation type	8
Table 5-3	Summary of the Great Letaba River's PES, EI, ES and impacts.....	9
Table 6-1	Rating of impact spatial extent.....	17
Table 6-2	Rating of impact duration.....	17
Table 6-3	Rating of potential impact intensity	17
Table 6-4	Rating of impact probability	18
Table 6-5	Rating of overall impact significance.....	18
Table 7-1	Top 12 dominant families and most dominant growth forms obtained from the POSA website for the QDS 2330AA and on site	19
Table 7-2	Broad Habitat/Vegetation communities.....	19
Table 7-3	Additional Plant species identified within the different habitats.....	24
Table 7-4	Level 1-4 wetland classification	26
Table 7-5	Numbers of conservation important plant species per Red Data category within South Africa and Gauteng (date accessed: August 2016).....	29
Table 7-6	Potential CI species based on information obtained from 2527BD and 2528CA QDG as well as from surrounding studies.....	31
Table 7-8	Summary of potential faunal diversity and threatened species.....	33
Table 7-9	Potentially occurring threatened and Data Deficient mammal species	36
Table 7-10	Potentially occurring threatened bird species.....	36
Table 9-1	Summary of impact significance, without and with mitigation	51
Table 10-1	Impact Assessment	53
Table 10-2	Mitigation measures	56

LIST OF FIGURES

Figure 1-1	Localition of the study site	7
Figure 5-1	Historical Imagery showing land use practices on and surrounding the site.....	4
Figure 5-2	Land use practices on and surrounding the site.....	5
Figure 5-3	Monthly rainfall for Thohoyandou.....	6
Figure 5-4	Temperatures for Thohoyandou	6

Figure 5-4	Terrain units occurring within land type Ae20 (AGIS 2014)	7
Figure 5-5	Regional vegetation type and land type wherein the study site is situated	10
Figure 5-6	Eco-region and quaternary catchment wherein the study site is situated	11
Figure 6-1	Main vegetation sampling points.....	13
Figure 6-1	IUCN Red List categories	16
Figure 7-1	Photographs of the habitats within and surrounding the Study Site	20
Figure 7-2	Examples of Species found on site	22
Figure 7-3	Vegetation communities within the study area	23
Figure 7-5	Wetland features and associated 50m buffer.....	27
Figure 7-4	Features of the in situ wetland	28
Figure 7-7	Conservation Important species on Site	32
Figure 8-1	Terrestrial Priority Area and Threatened Ecosystem wherein the study site is situated.....	43
Figure 8-2	Classification of regional rivers and wetlands under the NFEPA.....	44
Figure 8-3	Location of the site in the context of the Limpopo Sector / C-Plan	45
Figure 8-4	Local Areas of Conservation Significance.....	48

LIST OF ACRONYMS

ACRONYM	DESCRIPTION
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CI	Conservation Important
CIS	Conservation Important Species
CITIES	Convention of International Trade in Endangered Species of Wild Fauna and Flora
CR	Critically Endangered – a Red Data classification used by the IUCN for describing species in serious danger of facing extinction
CR PE	Critically Endangered, Possibly Extinct
CSIR	The Council for Scientific and Industrial Research
DD	Data Deficient – a Red Data classification used by the IUCN for describing species for which there is inadequate data available to assess their danger of facing extinction
DDD	Data Deficient - Insufficient Information
DDT	Data Deficient - Taxonomically Problematic
DEA	Department of Environmental Affairs
Dec	Declining
DWA	Department of Water Affairs (Previously known as DWAF)
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation (Previously known as DWA)
ECA	Environmental Conservation Act (Act 73 of 1989)
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme

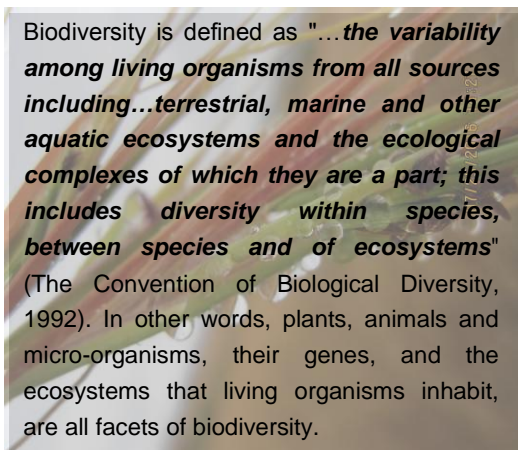
ACRONYM	DESCRIPTION
EMPR	Environmental Management Programme Report
EN	Endangered – Red Data for a species in danger of facing extinction
ES	Ecological Sensitivity
ESA	Ecological Support Area
EW	Extinct in the Wild
EX	Extinct
FEPA	Freshwater Ecosystem Priority Areas
GDACE	Gauteng Department of Agriculture, Conservation and Environment (GDACE)
GDARD	Gauteng Department of Agriculture and Rural Development (formally GDACE)
GG	Government Gazette
GN	Government Notice
I	Increasing
IA	Impact Assessment
IBA	Important Bird Area
ICMM	International Council on Mining and Metals
IUCN	International Union for the Conservation of Nature, based in Gland, Switzerland
LC	Least Concern – Red Data for species not in danger of facing extinction
LEMA	Limpopo Environmental Management Act
LoO	Likelihood of Occurrence
MAP	Mean Annual Precipitation
MBG	Mining and Biodiversity Guideline
NBSAP	National Biodiversity Strategy and Action Plan
NE	Not Evaluated
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:PAA	National Environmental Management: Protected Areas Act (Act 57 of 2003)
NEMA	National Environmental Management Act (Act 107 of 1998)
NEPAD	New Partnership for Africa's Development
NFA	National Forest Act (Act 48 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act 25 of 1999)
NMPRD	National Mineral and Petroleum Resources Development Act (Act 28 of 2002)
NR	Not Recognised by Birdlife International
NRF	National Research Foundation
NSBA	National Spatial Biodiversity Assessment
NSS	Natural Scientific Services CC
NT	Near Threatened – a Red Data classification used by the IUCN for describing species not yet in danger of facing extinction, but close to such a state
NVFFA	National Veld and Forest Fire Act (Act 101 of 1998)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
POSA	Plants of South Africa
PRE	PRECIS database system (National Herbarium Pretoria)
PrSciNat	Registration as a Professional Natural Scientist

ACRONYM	DESCRIPTION
PS	Protected Species
QDGS	Quarter Degree Grid Square – the basic unit used by the Surveyor General for creation of 1:50 000 topographical maps
QDSs	Quarter degree squares
R	Rare
RHP	River Health Programme
S	Stable
SABAP	Southern African Bird Atlas Project
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SASS5	South African Scoring System version
SMP	Strategic Management Plans
SoER	State of Environment Report
ToPS	Threatened or Protected Species
ToR	Terms of Reference
TSP	Threatened Species Programme – a programme managed by SANBI to assess the Red Data status of South African plants
U	Unknown
UJ	University of Johannesburg
UP	University of Pretoria
VU	Vulnerable – a Red Data classification used by the IUCN for describing species in danger of facing extinction
WITS	University of the Witwatersrand
WMA	Water Management Area
WQ	Water Quality
WRC	Water Research Commission
WSA	Water Service Act (Act 108 of 1997)
WWF	Worldwide Fund for Nature

1. Introduction

The “Special Needs Skills and Development Programme” for the Council for Scientific and Industrial Research (CSIR) is currently undertaking the necessary environmental authorisations, under the National Environmental Management Act (NEMA; Act 107 of 1998) and the National Water Act (NWA; Act 36 of 1998), to develop a small-scale poultry production facility, referred to as Mashau Bodwe Chicken Facility. The project site is situated (at co-ordinates 23°10'20”S and 30°11'45” E) in Mashau Bodwe Village near Elim in Limpopo Province (**Figure 1-1**). The proposed infrastructure includes three chicken houses and a water reservoir, which would collectively cover 0.6ha of the 7.8ha property.

The CSIR appointed Natural Scientific Services CC (NSS) to complete an ecological scan (excluding wetland delineation, PES, ES and EIS assessments) for the proposed project in line with NEMA and NWA requirements. NEMA speaks of “the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations”. The objective of the more recently gazetted National Environmental Management Biodiversity Act (NEM:BA; Act 10 of 2004) is to provide for, inter alia, the management and conservation of South Africa’s biodiversity within the framework NEMA; the protection of species and ecosystems that warrant national protection; and the sustainable use of indigenous biological resources.



Biodiversity is defined as “...**the variability among living organisms from all sources including...terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems**” (The Convention of Biological Diversity, 1992). In other words, plants, animals and micro-organisms, their genes, and the ecosystems that living organisms inhabit, are all facets of biodiversity.

The NWA is the principle legal instrument relating to water resource management in South Africa, with all wetlands protected under the NWA. The NWA acknowledges:

“the National Government's overall responsibility for and authority over the nation's water resources and their use, including the equitable allocation of water for beneficial use, the redistribution of water, and international water matters.”

As per Chapter 3 of the NWA: Protection of Water Resources:

“The protection of water resources is fundamentally related to their use, development, conservation, management and control. Parts 1, 2 and 3 of this Chapter lay down a series of measures which are together intended to ensure the comprehensive protection of all water resources.”

LOCALITY

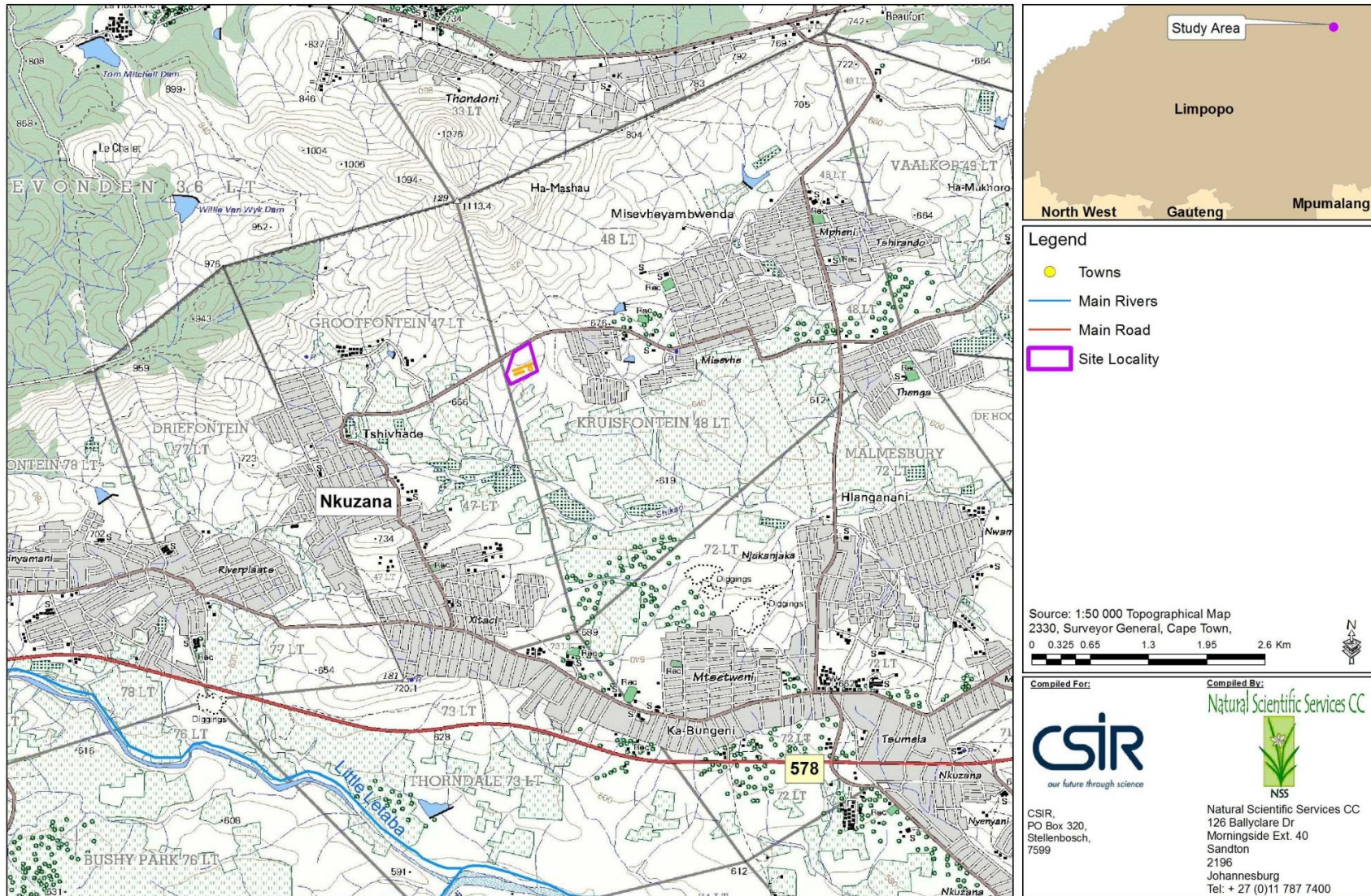


Figure 1-1 Locality of the study site



2. Terms of Reference

The assessment was performed according to the methodology agreed between the CSIR and NSS, and this report includes:

- A broad description of the biophysical attributes of the study area (relevant to an eco assessment);
- A list of any applicable legislation, guidelines, standards and criteria to be considered in project planning (e.g. whether permits required for removal of certain species);
- Broad determination of the conservation importance (in terms of national and provincial priorities) of the sampled area;
- The different vegetation types found, including overview on structure, dominant plant composition and condition;
- Species of Conservation Concern, if any, (Red Data / endemics / medicinal value) that could potentially occur in the site and surrounds;
- A **list** of potential impacts of the proposed project on biodiversity, and a list of recommended measures to mitigate these.
- Identification of any potential future work that may be required on site through the assessment and motivation as to why.

3. Project Team

The ecological scan was conducted and managed by NSS. The NSS team has extensive experience in project management and fieldwork for numerous ecological and biodiversity studies as well as aquatic and wetland assessments. The team has also been involved in the management of Environmental Impact Assessments (EIAs), Environmental Management Programme Reports (EMPRs), Strategic Management Plans (SMPs) and Environmental Management Plans (EMPs) for the Conservation, Mining, Waste, Commercial and Industrial sectors.

In terms of accreditation and professional registrations the following is applicable to NSS:

- Senior team members are registered Professional Natural Scientists in the ecological, environmental, aquatic and zoological fields.
- The aquatic specialist is SASS5 accredited with the Department of Water and Sanitation (DWS) to perform SASS5 (the South African Scoring System version 5) for aquatic macro-invertebrate monitoring.
- The wetland specialist is acknowledged by the DWS as a Competent Wetland Delineator.

Details of the project team are provided in **Table 3-1**.

Table 3-1 Project team with associated areas of specialisation

PROJECT ROLE	SPECIALIST	QUALIFICATIONS
Vegetation and Project Management	Susan Abell	M.Sc. Resource Conservation Biology (WITS) <i>PrSciNat</i> Registered (400116/05) – Ecology & Environmental Science
Wetland Input (wetland assessment was not part of this scope)	Kathy Taggart	MSc Resource Conservation Biology (WITS) DWS Acknowledged – wetland/riparian delineator <i>PrSciNat</i> Registered (400225/08) – Ecology & Environmental Science
Fauna	Dr Caroline Lötter	Ph.D Zoology (UP) <i>PrSciNat</i> Registered (400182/09) – Zoology
	Tyron Clark	B.Sc. MSc Zoology (WITS) – in progress
GIS mapping	Tim Blignaut	B.Sc. Honours Geography (UJ)

4. Applicable Legislation

Legislation, policies and guidelines, which could apply to impacts of the proposed project on biodiversity, are listed below. Although the list is comprehensive, additional legislation, policies and guidelines that have not been mentioned may apply.

4.1. International Agreements

- (Bonn) Convention on the Conservation of Migratory Species of Wild Animals.
- The Ramsar Convention (on wetlands of international importance especially as waterfowl habitat).
- Convention on Biological Diversity including eco-systems and genetic resources.
- Agenda 21 regarding the sustainable development at global and national levels.
- The Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).
- Earth Summit (1992).
- World Summit on Sustainable Development (2002).
- Johannesburg Declaration and Plan of Implementation for sustainable development.
- The 7th United Nations Millennium Development Goal

4.2. International Policies and Agreements

- International Council on Mining and Metals (ICMM): good practice guidance on mining and biodiversity (Johnson & Starke, 2006).

4.3. Regional Agreements

- Action Plan of the Environmental Initiative of NEPAD for sustainable development in Africa.

4.4. National Legislation

- Conservation of Agricultural Resources Act (CARA, Act 43 of 1983).
- Environmental Conservation Act (ECA, Act 73 of 1989).
- Constitution of the Republic of South Africa (Act 108 of 1996).
- Water Services Act (WSA, Act 108 of 1997).
- National Water Act (NWA, Act 36 of 1998).
- National Forests Act (NFA, Act 84 of 1998) and Protected Tree Species.
- National Veld and Forest Fire Act (NVFFA, Act 101 of 1998).
- National Environmental Management Act (NEMA; Act 107 of 1998).
- National Heritage Resources Act (NHRA, Act 25 of 1999).
- National Mineral and Petroleum Resources Development Act (NMPRD, Act 28 of 2002).
- National Environmental Management: Protected Areas Act (NEM:PA, Act 57 of 2003).
- National Environmental Management: Biodiversity Act (NEM:BA; Act 10 of 2004):
 - National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of NEM: BA (Government Gazette [GG] 34809, Government Notice [GN] 1002, 9 December 2011).
 - Alien and Invasive Species Regulations (GG 37885, 1 August 2014).
 - Threatened or Protected Species Regulations and list (GG 38600, GN 225, 31 March 2015).
- National Environmental Management: Air Quality Act (Act 39 of 2004).

4.5. National Policies, Guidelines & Programmes

- National Spatial Biodiversity Assessment (NSBA) (Driver *et al.* 2004) including Priority Areas and Threatened Ecosystems.
- National Biodiversity Strategy and Action Plan (NBSAP) (DEA 2005).
- National Aquatic Ecosystem Health Monitoring Program including the River Health Programme (initiated by the DWAF, now the DWA).
- National Freshwater Ecosystem Priority Areas project (Driver *et al.* 2011).
- Environmental Best Practice Guidelines: Planning. Integrated Environmental Management (DWAF 2005).
- Mining and Biodiversity Guideline (MBG) (DEA *et al.* 2013).
- National Water Resource Strategy (DWAF 2013).

4.6. Provincial Legislation, Policies & Guidelines

- Limpopo Environmental Management Act (LEMA; Act 7 of 2003).
- Limpopo Conservation Plan V2 Technical Report (LEDET 2013).
- Limpopo State of Environment Report (SoER), 2004.
- Makhado Municipality Integrated Development Plan. IDP Review. 2013/14.

5. Study Site Description

5.1. Location and land use

The site for the proposed Mashau Bodwe Chicken Facility is situated on the farm Kruisfontein (23°10'20"S; 30°11'45" E) between Bodwe and Misevhe Villages (23°10'20"S; 30°11'45" E) 14.5km ESE of Elim in the Makhado District of Limpopo Province (**Figure 1-1**). The proposed development includes the construction of three chicken houses (supporting 120,000 egg-laying hens at a time) and a dam, collectively covering **0.6ha** of the 7.8ha property.

Regional land use comprises rural human settlement along with communal livestock grazing and wood harvesting. It was immediately apparent upon arrival that the site had been tilled in the past. This is also evident in historical Google Earth imagery of the site (**Figure 5-1**). Since 2002, the site has been fenced, and crop production ceased, and there is little evidence of surrounding land use practices. Consequently the site has recovered well and the tree component is re-establishing, but is far from climax. However, tall stands of rank grass and dense, almost impenetrable, bushclumps together with the perimeter firebreak suggest under-utilization of the veld (**Figure 5-2**).



November 2002

March 2016

Figure 5-1 Historical Imagery showing land use practices on and surrounding the site



Fire break along boundary fence



Evidence of underutilisation on site



Human settlement and livestock grazing nearby



Evidence of past wood harvesting on site

Figure 5-2 Land use practices on and surrounding the site

5.2. Climate

The study region falls within a warm, temperate, summer rainfall region characterised by cool, frost-free winters and hot summers. The mean annual precipitation for Louis Trichardt is about 495mm. The dry period generally spans May to August, dipping in August, while the rainy seasons occurs from December to March, peaking in January (**Figure 5-3**).

Temperatures rarely drop below zero during winter, and the climate is moderately isothermic, varying by no more than 17°C between monthly highs and lows in 2015-16. The maximum summer temperature is experienced from November to February with an average high of 30°C. The lowest temperatures are experienced between May and August (**Figure 5-4**).

The field work was conducted on the back of the country experiencing one of its worst droughts. Moreover, cold, rainy conditions prevailed during the NSS site visit. July 2016 received 8mm of rainfall which mostly fell on the day of the site visit, and also yielded the lowest recorded temperature (4°C) for the 2015-2016 period. This significantly reduced faunal activity and consequently, very few animals were observed during the site visit.

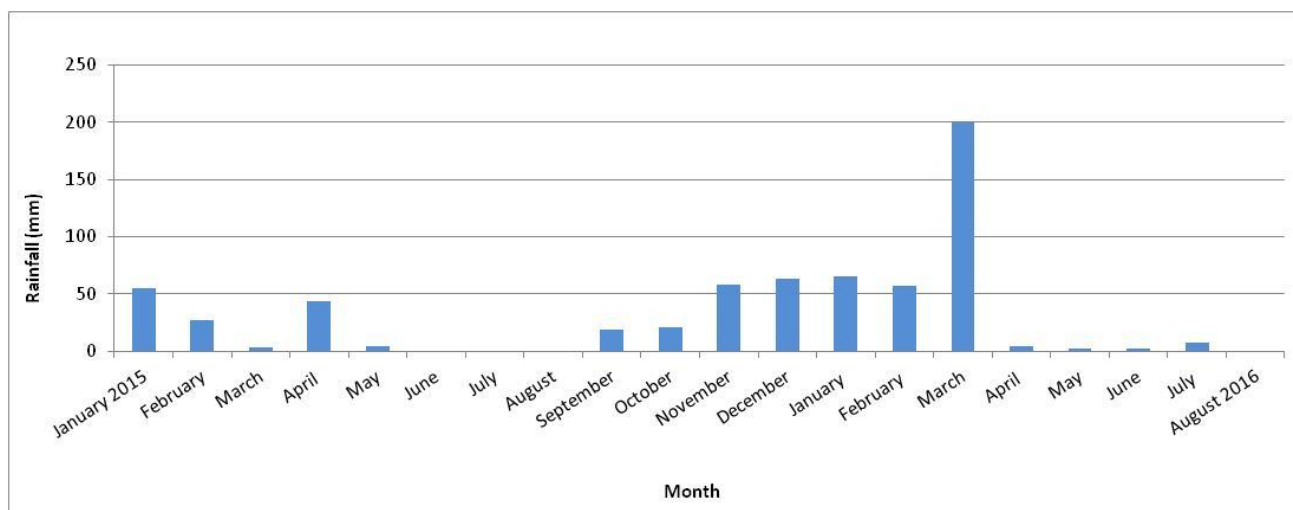


Figure 5-3 Monthly rainfall for Thohoyandou

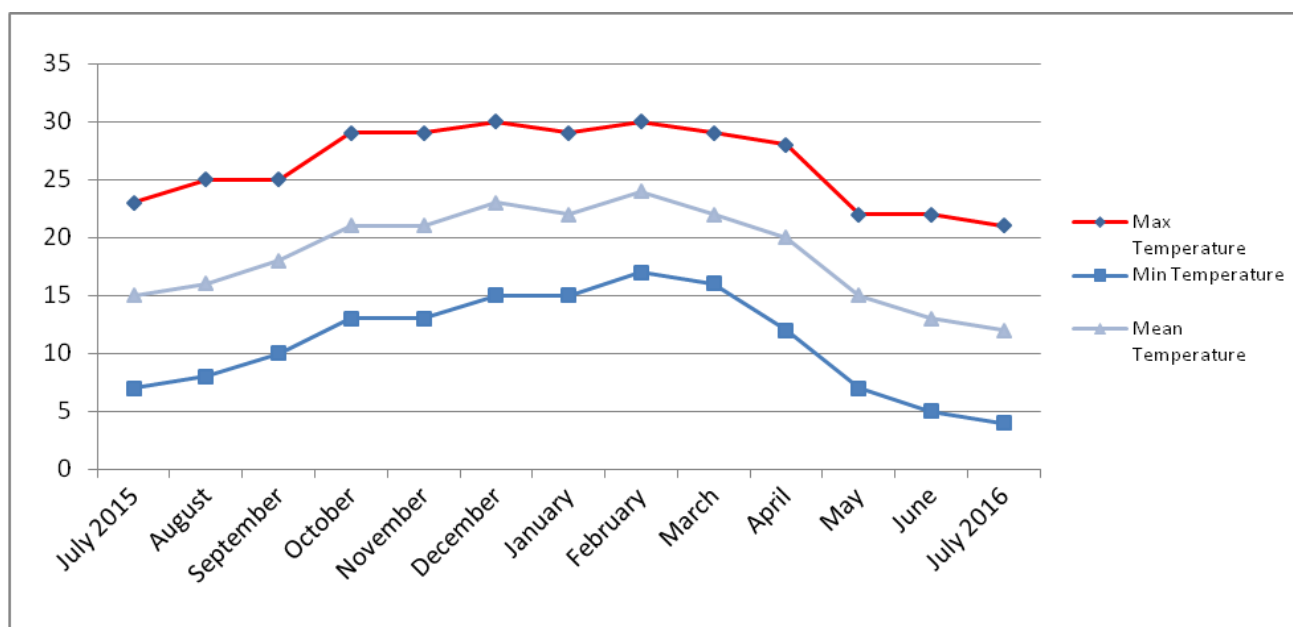


Figure 5-4 Temperatures for Thohoyandou

5.3. Geology and soils

The study site is situated in land type¹ Bd48 (**Figure 5-6**), supporting mostly biotite gneiss and migmatite of the Goudplaats-Hout River Gneiss Suite as well as granite and syenite of the Schiel Complex (AGIS, 2014). The site is situated at the foot of a significant igneous outcrop; however, the prevailing geology is more likely to be associated with the widespread granitoid gneisses of the Goudplaats-Hout River Gneiss Suite. The rocks of this paleoarchaen intrusion are among the oldest in South Africa at approximately 2900 Ma (Johnson, 2006). Based on the site's position on a footslope indicated by terrain unit indicator value of 3 (**Figure 5-5**), the dominant soil forms within the land type according to AGIS (2014) are likely to be that of Glenrosa (55 %), Leslie (19 %), Wasbank (15) and Swartland (10). These are generally sandy /

¹ Land types represent areas that are uniform with respect to climate, terrain form, geology and soil.



gravelly and well-drained soils in this area (Mucina and Rutherford, 2006). Presented in **Table 5-1** is an overview of the soil forms and their extent of coverage, which can be expected within different terrain units in land type Bd48 (AGIS, 2014).

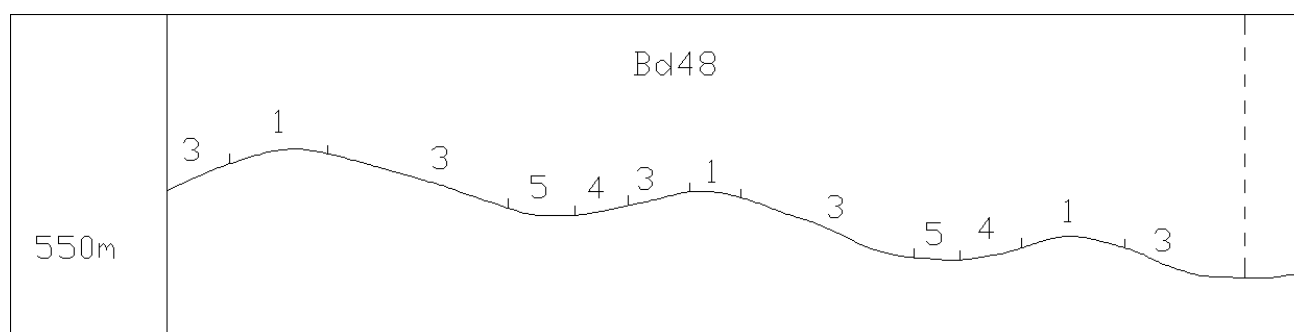


Figure 5-5 Terrain units occurring within land type Ae20 (AGIS 2014)

Table 5-1 Soil forms, their wetland potential, coverage, and erodibility classes within the terrain units of land type Bd48

SOILSERIES OR LAND CLASSES	DEPTH (mm)	% COVER PER TERRAIN UNIT			
		1	3	4	5
Terrain unit		1	3	4	5
Slope		1-6	3-15	1-6	2-10
Rock		2	1		
Platt GS14, Glenrosa Gs15	400-700	45	55	35	
Leslie Ge36	400-900	23	19	25	
Wasbank Wa21, Sandvlei Wa31	400-900	15	15	10	5
Swartland Sw31	700-1000	10	10	15	
Arniston Va31, Lindley Va41	>1200			10	40
Shorrocks (Hu36)	400-900	5		5	15
Stream bed					40

Source: AGIS (2014)

5.4. Vegetation

The study site falls within the Savanna Biome in South Africa as classified by Rutherford and Westfall (1986), and the ***SVI 8 Tzaneen Sour Bushveld*** vegetation type (**Figure 5-6**) as described by Mucina and Rutherford (2006). The ***Tzaneen Sour Bushveld*** vegetation unit comprises of deciduous, tall open bushveld (parkland) trees with a well-developed, tall grass layer occurring on low to high mountains with undulating plains mainly at the base of, and on the lower to middle slopes of the northeastern escarpment.

The Ecosystem conservation status as per Mucina and Rutherford (2006) of this system is listed as **Endangered**. Dominant tree and shrub species are listed in (**Table 5-2**). In 2006, about 41% of the vegetation type had been transformed, mainly by cultivation (29%) and plantations (9%). The higher-lying parts of this vegetation unit have been heavily afforested with tree plantations while the lower-lying areas are under agricultural and horticultural crops. Scattered alien plants include *Solanum mauritanum*, *Melia azedarach*, and *Caesalpinia decapetala*. The subtropical

climate is conducive to the spread of *Chromolaena odorata*, *Lantana camara* and *Psidium guajava*.

Table 5-2 Important plant species in the Tzaneen Sour Bushveld vegetation type

Growth form	Characteristic species
Tall Trees:	<i>Pterocarpus angolensis</i> , <i>Sclerocarya birrea</i> subsp. <i>caffra</i>
Small Trees:	<i>Acacia (Senegalia) polyacantha</i> (d), <i>Albizia versicolor</i> (d), <i>Ficus sansibarica</i> (d), <i>Parinari curatellifolia</i> (d), <i>Piliostigma thonningii</i> (d), <i>Pterocarpus rotundifolius</i> (d), <i>Trichilia emetica</i> (d), <i>Acacia (Vachellia) davyyi</i> , <i>Acacia (Vachellia) sieberiana</i> var. <i>woodii</i> , <i>Antidesma venosum</i> , <i>Catha edulis</i> , <i>Faurea rochetiana</i> , <i>Faurea saligna</i> , <i>Ficus burkei</i> , <i>Ficus petersii</i> , <i>Heteropyxis natalensis</i> , <i>Peltophorum africanum</i> , <i>Terminalia sericea</i> , <i>Vernonia colorata</i>
Tall Shrubs:	<i>Olea europaea</i> subsp. <i>africana</i> , <i>Pseudarthria hookeri</i> var. <i>hookeri</i> , <i>Searsia pentheri</i> , <i>Triumfetta pilosa</i> var. <i>tomentosa</i>
Low Shrubs:	<i>Agathisanthemum bojeri</i> , <i>Barleria elegans</i> , <i>Dicliptera clinopodia</i> , <i>Flemingia grahamiana</i> , <i>Indigofera filipes</i> , <i>Polygala producta</i>
Woody Climbers:	<i>Bauhinia galpinii</i> , <i>Pterolobium stellatum</i>
Graminoids:	<i>Cymbopogon caesius</i> (d), <i>Cymbopogon nardus</i> (d), <i>Hyparrhenia cymbaria</i> (d), <i>Hyparrhenia poecilotracha</i> (d), <i>Hyperthelia dissoluta</i> (d), <i>Alloteropsis semialata</i> subsp. <i>semialata</i> , <i>Andropogon schirensis</i> , <i>Bothriochloa bladhii</i> , <i>Monocymbium ceresiiforme</i> , <i>Paspalum scrobiculatum</i> , <i>Schizachyrium sanguineum</i> , <i>Themeda triandra</i>
Herb:	<i>Waltheria indica</i>

Source: Mucina & Rutherford (2006)

Key: (d) = dominant species; Species in **Bold** indicate those identified in the study area

5.5. Hydrology

The study site falls within the Luvuvhu and Letaba Water Management Area (WMA), the Klein (Little) Letaba Quaternary Catchment B82F, and the Lowveld Ecoregion (3.01). The Lowveld Ecoregion is characterised by hot, dry bushveld with a low to moderate relief. The Lowveld supports many large perennial rivers such as the Crocodile, Komati, Sabie, Olifants, Letaba and Levuvhu (Kleinhans *et al.* 2005). Although none of these major rivers occur on, or adjacent to the site, a number of small small tributaries surround the site with one marginally entering it in the south-eastern corner. These tributaries drain into the Klein Letaba River, which ultimately feeds the Letaba River. The proximal reach of the Klein Letaba, which is fed in part by the tributary on site, is classified as a **Least Threatened (LT)** and Well Protected Lowveld Perennial/Seasonal Lower Foothill system (Nel & Driver, 2012).

A summary of the Present Ecological State (PES), Ecological Importance (EI), Ecological Sensitivity (ES) and current impacts on the Klein Letaba is presented in **Table 5-3** (DWS, 2014). The desktop-determined PES of the Klein Letaba is moderately modified (C category). According to the DWS (2014), the water quality (WQ) as well as instream and riparian habitats of this river is seriously influenced by agricultural lands. The river is largely impacted on by erosion and run-off/effluent from settlement areas as well as decreased habitat integrity from

sedimentation, urbanization and displacement of natural vegetation. The river is also moderately impacted by algal growth (likely from effluent), low level crossings and roads, alien vegetation grazing and trampling. Small scale abstraction for local irrigation practices impacts the river to a lesser extent.

The EI of the Klein Letaba is moderate because this sub-quaternary catchment is dominated by the **Endangered** grassland unit (*Sv18 Tzaneen Sour Bushveld -Figure 5-6*), but supports only a relatively modest assemblage of 7 protected and 4 endemic species. The ES of the Klein Letaba scores a moderate as there is a general lack of surface flow and consequently few if any flow dependant species and only a moderate-low proportion of the expected species are habitat specialists (DWS, 2014).

Table 5-3 Summary of the Great Letaba River’s PES, EI, ES and impacts

Quaternary Catchment	Water Resource	Present Ecological State (PES)	Ecological Importance (EI)	Ecological Sensitivity (ES)	Current Impacts
B81C	Klein Letaba River	Moderately Modified (C)	Moderate	Moderate	SMALL: Abstraction (run-of river)/increased flows, Irrigation, Small dams (farm), MODERATE: Algal growth, Crossings low water, Exotic vegetation, Roads, Grazing / trampling, LARGE: Erosion, Runoff/effluent: Urban areas, Sedimentation, Urbanization, Vegetation removal, SERIOUS: Agricultural lands, CRITICAL:None,

REGIONAL VEGETATION & LANDTYPES

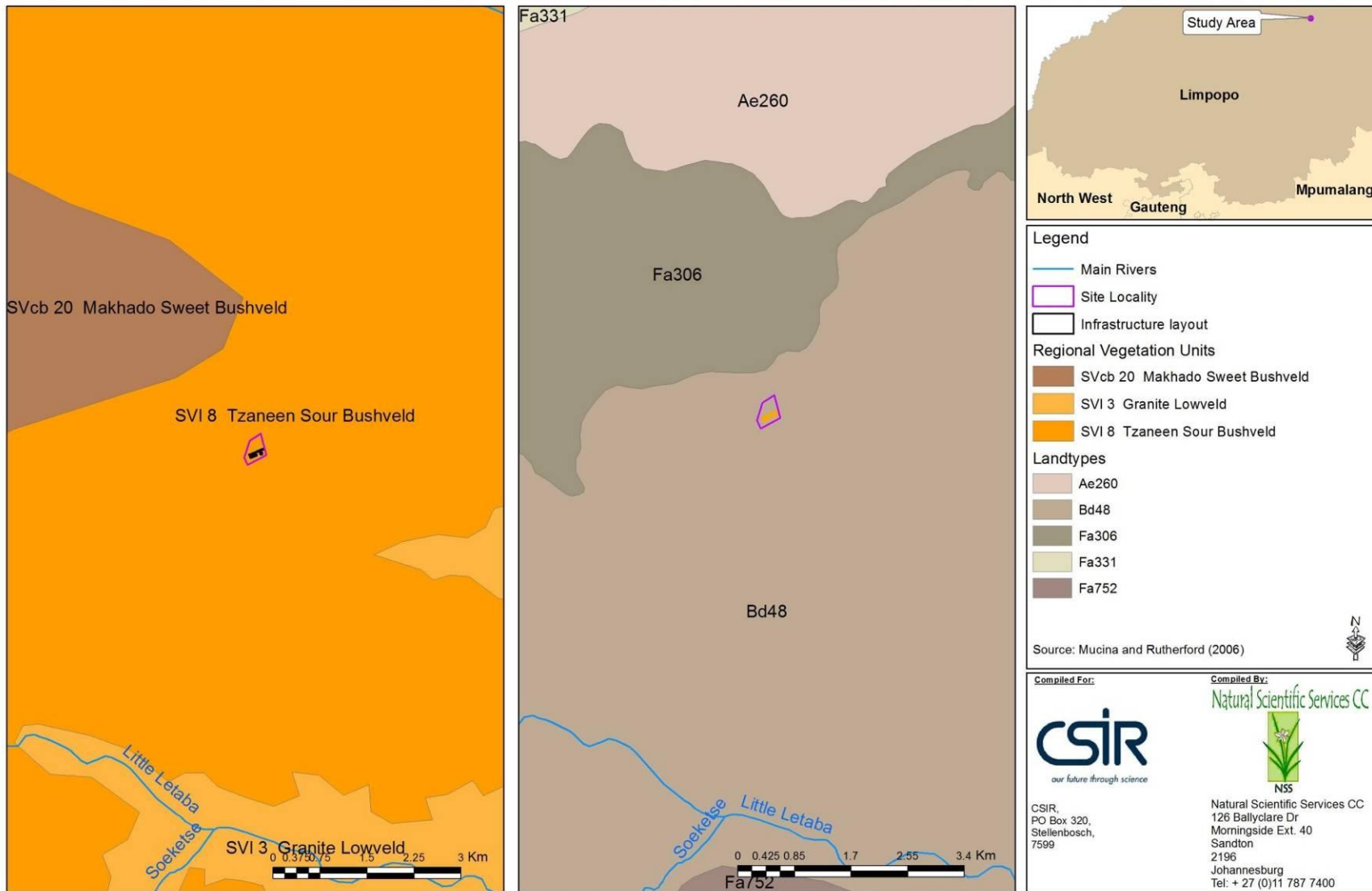


Figure 5-6 Regional vegetation type and land type wherein the study site is situated

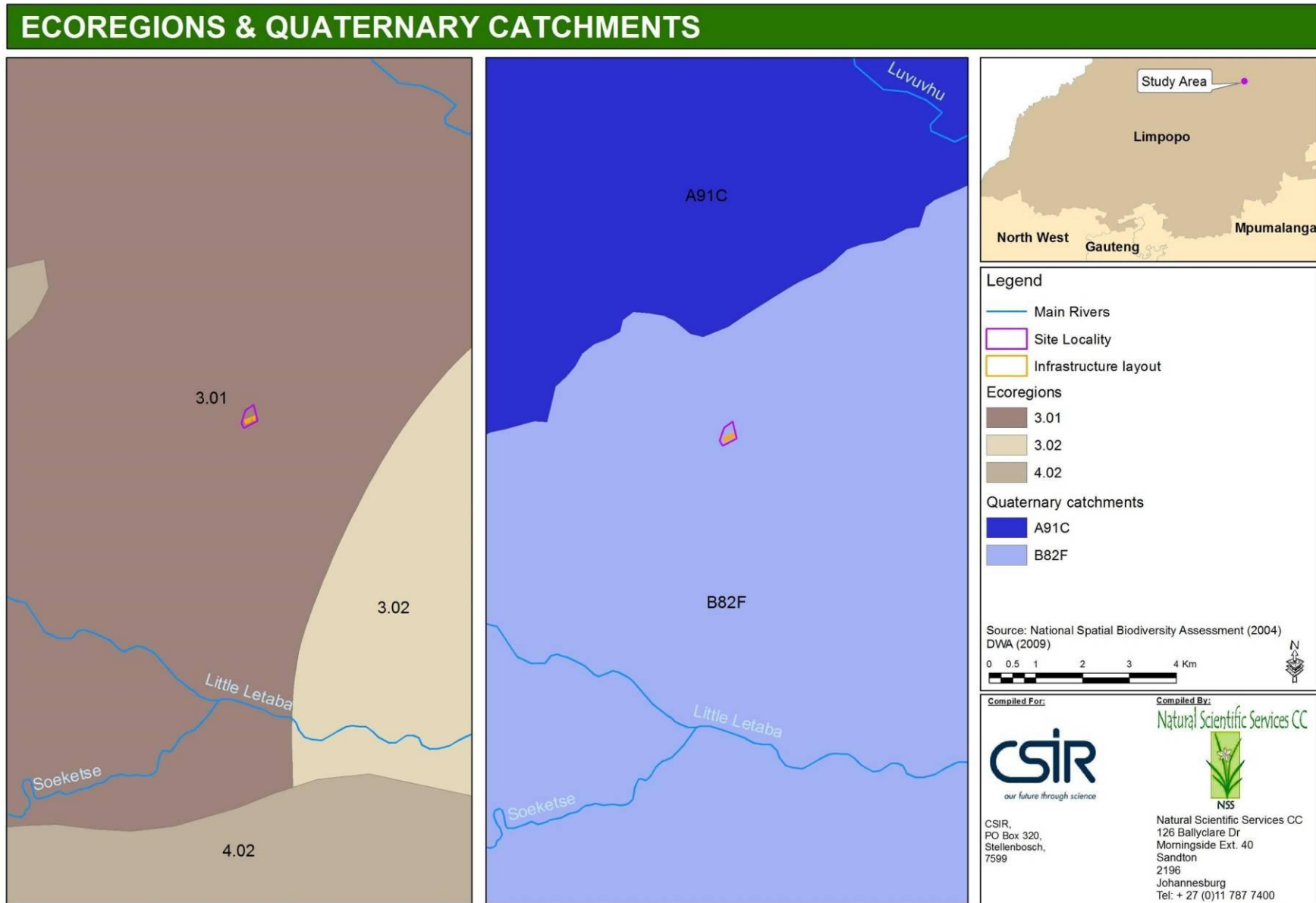


Figure 5-7 Eco-region and quaternary catchment wherein the study site is situated

6. Methodology

6.1. Vegetation & Floral Communities

Over 80% of the Study Site has been transformed through past farming (agricultural) practices. Therefore due to the transformed and homogeneous nature of the recovery areas, as well as the size of the study area, the sampling methods such as Braun-Blanquet cover-abundance approach (Mueller-Dombois & Ellenberg, 1974) was only used as a basis to form broader habitat units but the data was not analysed using TWINSPLAN. The vegetation component therefore included:

- A desktop assessment of the vegetation within the region and potential community structure based on the information obtained from:
 - SANBI's² Plants of South Africa (POSA) 2330AA QDS
 - Mucina & Rutherford's (2006) vegetation map of southern Africa.
 - The current Limpopo C-Plan.
 - CI plant species records in the study region (mainly obtained through POSA)
- A one day field investigation walking transects through the site:
 - Noting species, habitats and cover abundance. Sampling points are presented in **Figure 6-1**. Plant taxa were identified to species level (some cases, *cf* would be used if identification was limiting – *cf* means 'confer' or 'looks like'). Scientific names follow POSA (Accessed, August 2016).
 - Recording any observed alien and invasive plant species on site was also conducted. The identification of declared weeds and invader species as promulgated under: the NEMBA August 2014 regulations (GG37885); and the amended regulations (Regulation 15) of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983).
- Reporting including vegetation community descriptions, mapping of broad habitat types / vegetation communities and CI species analysis. For CI floral species, Likelihood of Occurrence (LO) rating is assigned to each species based on the availability of suitable habitat using the following scale: Present; Highly likely; Possible; Unlikely or No Habitat available.

² The South African National Biodiversity Institute



VEGETATION SAMPLING POINTS

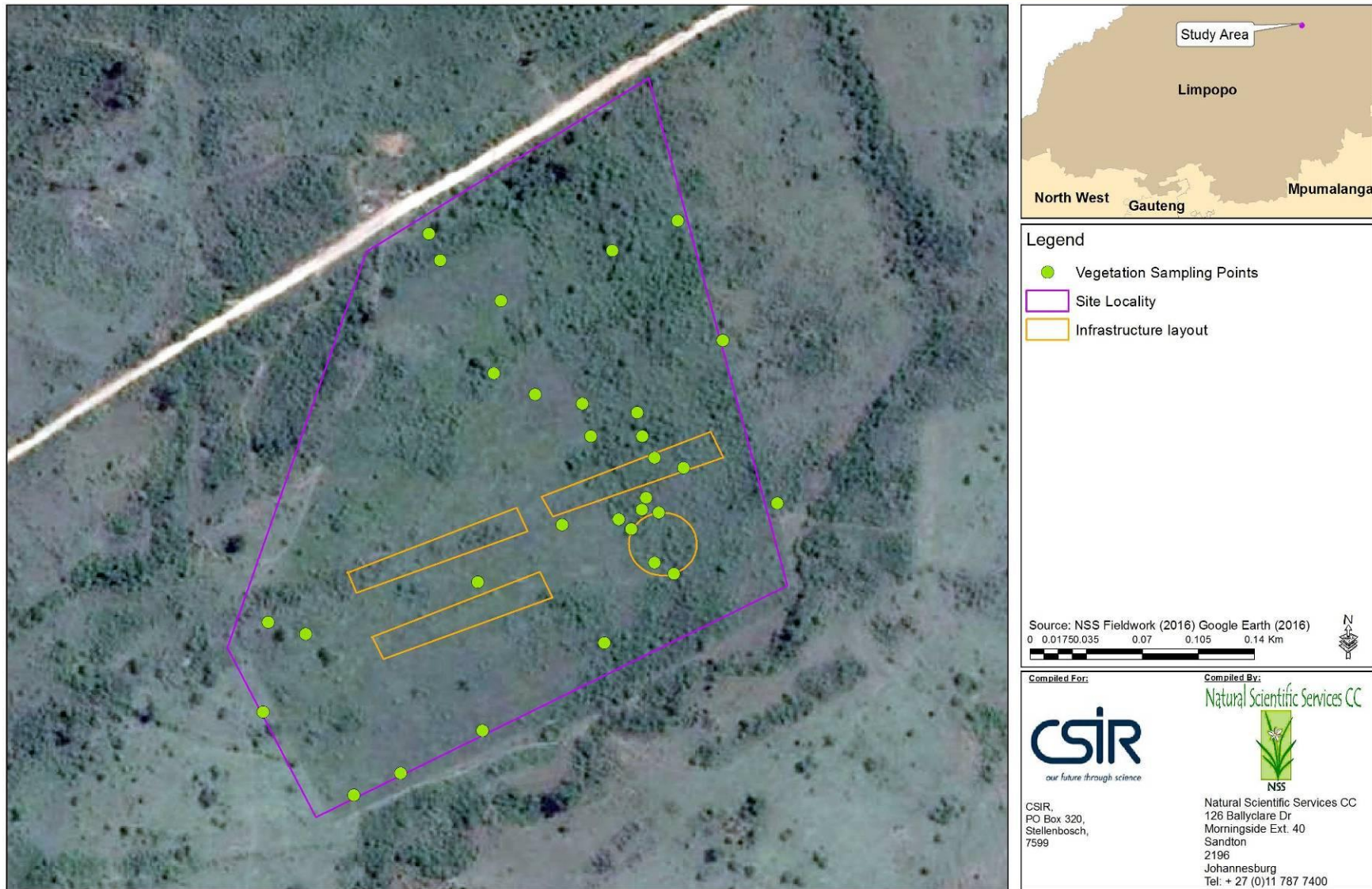


Figure 6-1 Main vegetation sampling points

6.1.1 Limitations

It is important to note that the absence of species on site does not conclude that the species is not present at the site. Reasons for not finding certain species during the late summer site visit may be due to:

- The short duration of fieldwork as well as the timing of the fieldwork (which occurred within the winter season – 25 July 2016). At the end of summer many species have died back and retracted making it difficult to confirm identification, specifically in grassland and fynbos biomes. In addition to this, the 2015/2016 season also has also been experiencing below average rainfall (South Africa is currently within a severe drought).
- Some plant species, which are small, have short flowering times, rare or otherwise difficult to detect may not have been detected even though they were potentially present on site.

Vegetation mapping was based on the brief in-field survey as well as aerial imagery. Positioning of the vegetation units may not be exact due to potential georeferencing errors displayed in Google Earth, GPS accuracy in field as well as the age of the aerial image.

6.2. Fauna

6.2.1 Desktop Research

A list of species potentially occurring in the study area was compiled for:

- Mammals, including bats, using the published species distribution maps in Friedmann & Daly (2004) and Stuart & Stuart (2007), and Monadjem *et al.* (2010), respectively, and online species distribution data from MammalMAP (2016) for the quarter degree square (QDS) 2330AA.
- Birds, using the latest online list of bird species from the second Southern African Bird Atlas Project (SABAP 2) for pentad 2310_3010, which included records of bird species that were observed in QDS 2330AA during the first SABAP (SABAP 1).
- Reptiles, using the published species distribution maps in Bates *et al.* (2014), and online species distribution data from ReptileMAP (2016) for the relevant QDS.
- Frogs, using the published species distribution maps in Minter *et al.* (2004), and online species distribution data from FrogMAP (2016) for the relevant QDS.
- Butterflies, the published species distribution maps in Mecenero *et al.* (2013), and online species distribution data from LepiMAP (2016) for the relevant QDS.
- Odonata, using the published distribution maps in Samways (2008), and online species distribution data from OdonataMAP (2016) for the relevant QDS.
- Scorpions, using the published species distribution maps in Leeming (2003). ScorpionMAP (2016) did not have scorpion records from QDS 2330AA.

The lists were refined based on our field observations, where the Likelihood of Occurrence (LoO) of each species was rated using the following scale:

- 1 Present: the species is present.



- 2 High: the species is highly likely to occur based on available distribution data, and observed habitats and disturbances.
- 3 Moderate: the species may occur based on available distribution data, and observed habitats and disturbances.
- 4 Low: the species is unlikely to occur based on observed habitats and disturbances.

6.2.2 Fieldwork

Faunal observations were made while driving, walking, and inspecting different habitats in and adjacent to the study site. Taxa were identified based on their calls and/or observations of dead or live specimens, spoor, droppings, burrows and other evidence. Rocks and logs were turned to find reptiles, frogs and scorpions. A sweep net was carried to catch any observed butterflies, dragonflies and damselflies.

6.2.3 Conservation Status of Species

In the appended faunal lists:

- The legislated status of species under the National Environmental Management: Biodiversity Act (NEM:BA 2004) is given, as indicated for mammals, birds, reptiles and scorpions in the 2015 list of Threatened or Protected Species (ToPS). No frog, butterfly or odonatan species is included in this list.
- The global and/or the regional or national Red List status is provided for:
 - Mammals as stated by the IUCN, and Friedmann & Daly (2004), respectively.
 - Birds as stated in Taylor *et al.* (2015).
 - Reptiles as stated in Bates *et al.* (2014).
 - Frogs as stated by the IUCN, and Minter *et al.* (2004), respectively.
 - Butterflies as stated in Mecenero *et al.* (2013).
 - Dragonflies and damselflies (i.e. odonata) as stated in Samways (2006).

An atlas and Red Data book for South African scorpion species has not yet been published. Many species that have been listed under NEM:BA as ToPS face significant threat from trade, whereas Red-Listed species may be threatened by factors other than, or in addition to, trade. *Unless otherwise stated, the most threatened status of a species is provided in text, whether this is at a global, regional or national scale, or under NEM:BA.* Shown in **Figure 6-2** are the IUCN's Red List categories, which have been adopted to a large extent in regional / national assessments of animal taxa.

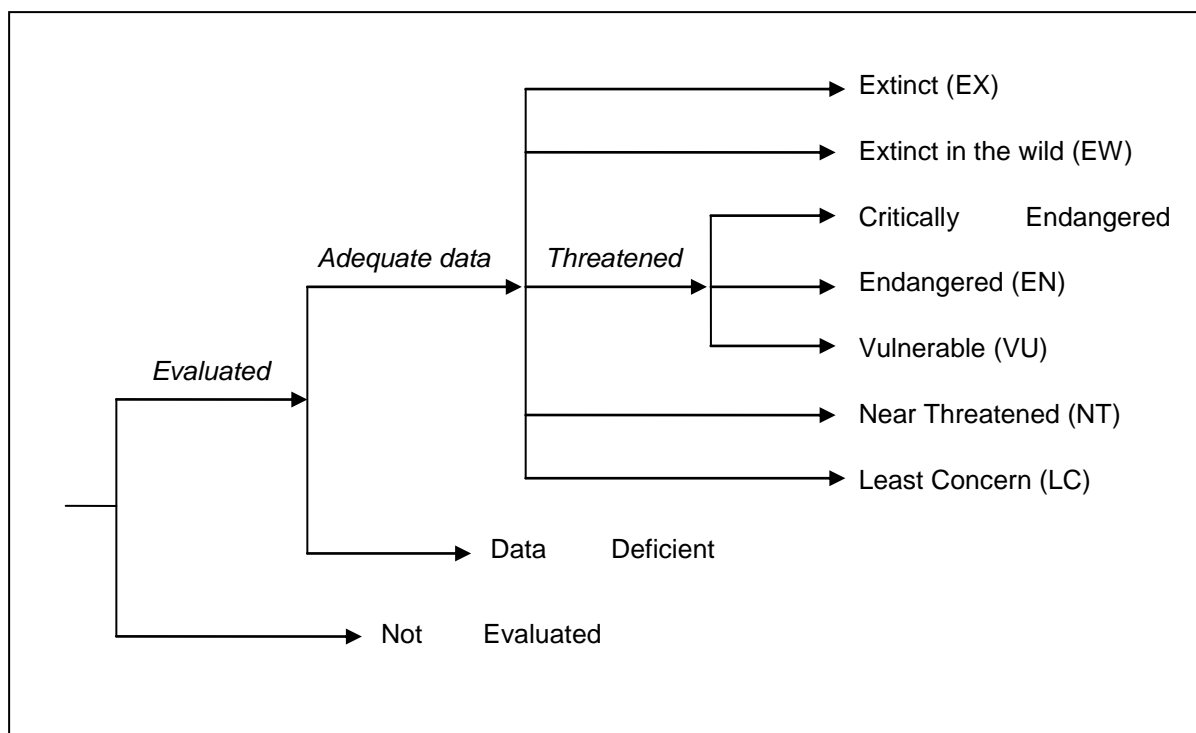


Figure 6-2 IUCN Red List categories

6.2.4 Limitations

- The site visit was limited to a few daytime hours in mid-winter, following an exceptionally dry summer, and during most of the visit it was raining. *Conditions were consequently highly unfavourable for animal activity.* Very few birds were heard calling, and no butterflies were seen flying. Certainly many more species would have been detected had the survey been performed for a longer period, in summer, and *subsequent to good rainfall.*
- Some species, which are uncommon, small, secretive or otherwise difficult to detect may not have been detected even though they were potentially present.

6.3. Impact Assessment

The Impact Assessment (IA) was performed according to the CSIR's IA methodology, which takes into account:

- Impact nature (direct, indirect and cumulative);
- Impact status (positive, negative or neutral);
- Impact spatial extent (**Table 6-1**);
- Impact duration (**Table 6-2**);
- Potential impact intensity (**Table 6-3**);
- Impact reversibility (high, moderate, low or irreversible);
- Irreplaceability of the impacted resource (high, moderate, low or replaceable);
- Impact probability (**Table 6-4**);
- Our confidence in the ratings (high, moderate or low);

Overall impact significance (**Table 6-5**) is calculated as:

Impact significance = Impact magnitude x Impact probability

where

Impact magnitude = Potential impact intensity + Impact duration + Impact extent

Table 6-1 Rating of impact spatial extent

EXTENT DESCRIPTION	SCORE
Site specific	1
Local (<2km from site)	2
Regional (within 30km of site)	3
National	4
International/Global	5

Table 6-2 Rating of impact duration

DURATION DESCRIPTION	SCORE
Temporary (less than 2 years) or duration of the construction period. This impact is fully reversible. <i>E.g. the construction noise temporary impact that is highly reversible as it will stop at the end of the construction period</i>	1
Short term (2 to 5 years). This impact is reversible.	2
Medium term (5 to 15 years). The impact is reversible with the implementation of appropriate mitigation and management actions.	3
Long term (>15 years but where the impact will cease after the operational life of the activity). The impact is reversible with the implementation of appropriate mitigation and management actions. <i>E.g. the noise impact caused by the desalination plant is a long term impact but can be considered to be highly reversible at the end of the project life, when the project is decommissioned</i>	4
Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient). This impact is irreversible. <i>E.g. The loss of a palaeontological resource on site caused by construction activities is permanent and would be irreversible.</i>	5

Table 6-3 Rating of potential impact intensity

NEGATIVE POTENTIAL INTENSITY DESCRIPTION	RATING	SCORE
Potential to severely impact human health (morbidity/mortality); or to lead to loss of species ³ (fauna and/or flora)	Very High/Fatal Flaw	16
Potential to reduce faunal/flora population or to lead to severe reduction/alteration of natural process, loss of livelihoods / severe impact on quality of life ⁴ , individual economic loss	High	8
Potential to reduce environmental quality – air, soil, water. Potential	Medium	4

³Note that a loss of species is a global issue and is differentiated from a loss of “floral/faunal” populations.

⁴Note that a visual impact or air emissions for example could be considered as severely impacting on quality of life should it constitute more than a nuisance but not being life threatening.

NEGATIVE POTENTIAL INTENSITY DESCRIPTION	RATING	SCORE
Loss of habitat, loss of heritage, reduced amenity		
Nuisance	Medium-Low	2
Negative change – with no other consequence	Low	1
POSITIVE POTENTIAL INTENSITY DESCRIPTION	RATING	SCORE
Potential Net improvement in human welfare	High	8
Potential to improve environmental quality – air, soil, water. Improved individual livelihoods	Medium	4
Potential to lead to Economic Development	Medium-Low	2
Potential positive change – with no other consequence	Low	1

“Irreplaceable loss of a resource” must be factored into the potential intensity rating of an impact

Table 6-4 Rating of impact probability

PROBABILITY DESCRIPTION	SCORE
Improbable (little or no chance of occurring <10%)	0.1
Low probability(10 - 25% chance of occurring)	0.25
Probable (25 - 50% chance of occurring)	0.5
Highly probable (50 – 90% chance of occurring)	0.75
Definite (>90% chance of occurring).	1

Table 6-5 Rating of overall impact significance

SCORE	RATING	SIGNIFICANCE DESCRIPTION
18-26	Fatally flawed	The project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating.
10-17	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.
5-9	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.
<5	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.

7. Results

7.1. Vegetation Structure

7.1.1 Comparative Regional Vegetation

SANBI frequently collect/collate floral data within Southern Africa and update their PRECIS database system (National Herbarium Pretoria (PRE) Computerised Information System) which is captured according to quarter degree squares (QDSs). This is referred to the POSA database. For this study, the Study Site falls within 2330AA which yielded 510 species

within 121 families. The dominant families being FABACEAE, POACEAE and ASTERACEAE (**Table 7-1**), with the graminoids (grasses) representing 9.8%, herbs representing 20.20%, and the wooded component representing over 41% of the total species listed for the area (**Table 7-1**). In terms of the site, structural representation was following the trend presented within the larger region, with wooded species, and graminoids being the most dominant – typical of savanna habitats (**Table 7-1**).

Table 7-1 Top 12 dominant families and most dominant growth forms obtained from the POSA website for the QDS 2330AA and on site

IMPORTANT FAMILIES	No. OF SPP	GROWTH FORMS	% TOTAL SPP	ON SITE
FABACEAE	66	Herb	20.2	7.69
POACEAE	50	Shrub- small tree	18.24	28.20
ASTERACEAE	40	Climber	10.2	2.56
RUBIACEAE	21	Graminoid	9.8	17.94
MALVACEAE	21	Shrub	8.63	15.34
CYPERACEAE	18	Dwarf shrub	7.25	2.56
LAMIACEAE	16	Tree	7.06	23.07
CONVOLVULACEAE	10	Bryophyte	3.92	-
ANACARDIACEAE	10	Cyperoid/Sedges	3.53	-
ACANTHACEAE	9	Geophyte	3.33	-
AMARANTHACEAE	9	Succulent	2.55	2.56
APOCYNACEAE	8	Lichen	1.76	-

7.1.2 On Site - Vegetation Communities

From the field investigations the study area was positioned on a southward slope dominated by transformed habitat (over 80% previously altered) with limited remaining primary vegetation (**Figure 7-1** and **Figure 7-3**). The broad habitat types identified on site through the field investigations and aerial imagery were defined as follows:

- Woodland / Bushveld Habitats
 - Primary Woodland
 - Secondary Woodland
- Wetlands
 - Hillslope Seep
- Transformed
 - Previously Farmed Habitat

Table 7-2 Broad Habitat/Vegetation communities

Vegetation Community	Conservation Significance	Area - Ha	Area -%
Woodland / Bushveld Habitats			
Primary Woodland	Moderate-High	1.57	18.35
Secondary Woodland	Moderate	3.92	45.57

Vegetation Community	Conservation Significance	Area - Ha	Area -%
Wetlands			
Hillslope Seep	High	0.03	0.35
Transformed			
Previously Farmed Habitat	Moderate-Low	3.10	35.70

Although largely transformed within the past, through farming, the site shows the characteristic species described by Mucina & Rutherford (2006) for the Endangered Tzaneen Sour Bushveld (SVI 8). The primary woodland habitat still yields some mature tree species such as *Sclerocarya birrea* subsp. *caffra*, *Pterocarpus rotundifolius*, *Erythrina lysistemon* and *Ficus*.



Piliostigma thonningii dominated Secondary Woodland



Hyperthelia – Heteropogon dominated Transformed Grasslands



Pterocarpus – Acacia - Ficus Dominated Primary Woodland

Figure 7-1 Photographs of the habitats within and surrounding the Study Site

The secondary woodland, which has developed over time from previous agricultural disturbances, is dominated by woody (small tree to shrub) species such as *Piliostigma thonningii*, *Rhoicissus tridentata*, *Flemingia grahamiana*, *Acacia (Senegalia) polyacantha*, *Searsia*, *Parinari curatellifolia*, *Faurea saligna*, *Peltophorum africanum* and *Vernonia colorata*. There is also sapling emergence of *Sclerocarya birrea* subsp. *caffra* scattered within this habitat.

The previously farmed areas that still contain large patches of graminoids is more monospecific with a less diverse species component. Graminoid layer is dominated by *Hyperthelia dissoluta*, *Heteropogon contortus*, *Cymbopogon* and *Hyparrhenia* species.

Alien, especially invasive⁵ plant species are a major threat to the ecological functioning of natural systems and to the productive use of land. The Study Site is previously transformed but does not present any dense infestations of alien species. Although a number of indigenous pioneer species are present including the bush encroachment species *Dichrostachys cinerea* and *Acacia karroo*.

The wetland habitat is discussed separately in **Section 7.1.3** below. Species recorded within the sampling area were grouped within the different habitats/vegetation units in **Table 7-3**.



Erythrina lysistemon



Pterocarpus rotundifolius

⁵ Two main pieces of national legislation are applicable to alien, invasive plants, namely the:

- Conservation of Agriculture Resources Act (CARA; Act 43 of 1983); and
- National Environmental Management: Biodiversity Act (NEM:BA; Act 10 of 2004):



Faurea saligna



Rhoicissus tridentate



Piliostigma thonningii



Flemingia grahamiana



Vernonia colorata



Hyperthelia dissoluta

Figure 7-2 **Examples of Species found on site**

VEGETATION COMMUNITIES

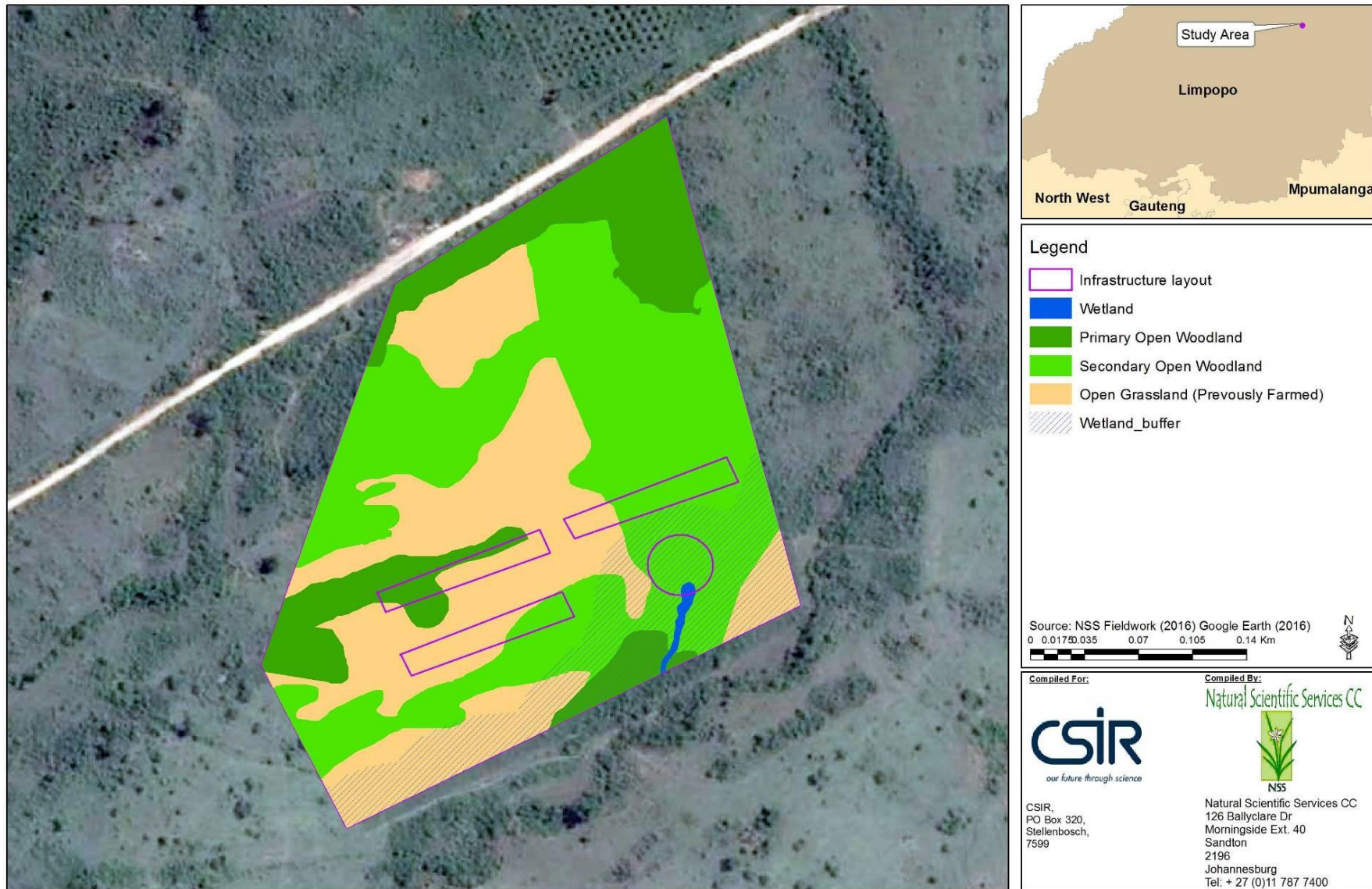


Figure 7-3 Vegetation communities within the study area

Table 7-3 Additional Plant species identified within the different habitats

Family	Species	Growth forms	Habitats		
			Primary Woodland	Secondary Woodland	Hyparhelia Grassland
FABACEAE	<i>Acacia caffra</i> (Thunb.) Willd.	Shrub, tree	√	√	
FABACEAE	<i>Acacia erubescens</i> Welw. ex Oliv.	Shrub, tree		√	
FABACEAE	<i>Acacia karroo</i> Hayne	Shrub, tree		√	
FABACEAE	<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh.	Shrub, tree	√	√	
MYRTACEAE	* <i>Psidium guajava</i>	Shrub, tree		√	
APOCYNACEAE	<i>Carissa bispinosa</i> (L.) Desf. ex Brenan	Shrub		√	
COMBRETACEAE	<i>Combretum molle</i> R.Br. ex G.Don	Tree	√	√	
ARALIACEAE	<i>Cussonia paniculata</i> Eckl. & Zeyh. subsp. <i>paniculata</i>	Succulent, tree	√		
FABACEAE	<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i>	Shrub, tree		√	√
DIOSCOREACEAE	<i>Dioscorea</i> spp	Climber	√		
EBENACEAE	<i>Diospyros lycioides</i> Desf.	Shrub	√	√	
BORAGINACEAE	<i>Ehretia rigida</i> (Thunb.) Druce	Shrub, tree		√	
FABACEAE	<i>Erythrina lysistemon</i> Hutch.	Tree	√		
EBENACEAE	<i>Euclea crispa</i> (Thunb.) Gürke	Shrub, tree	√		
PROTEACEAE	<i>Faurea saligna</i> Harv.	Tree	√		
MORACEAE	<i>Ficus</i> cf. <i>sycomorus</i> L.	Tree	√		
RUBIACEAE	<i>Gardenia ternifolia</i> Schumach. & Thonn.	Shrub, tree	√	√	
POACEAE	<i>Heteropogon contortus</i> (L.) Roem. & Schult.	Graminoid		√	√
ASTERACEAE	<i>Hilliardiella oligocephala</i> (DC.) H.Rob.	Herb			√
POACEAE	<i>Hyparrhenia hirta</i> (L.) Stapf	Graminoid			√
POACEAE	<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton	Graminoid			√

Family	Species	Growth forms	Habitat		
			Primary Woodland	Secondary Woodland	Hypartheia Grassland
KIRKIACEAE	<i>Kirkia wilmsii</i> Engl. (possible seedling)	Tree			
VERBENACEAE	<i>Lippia javanica</i> (Burm.f.) Spreng.	Shrub		√	√
LOBELIACEAE	<i>Lobelia flaccida</i> (C.Presl) A.DC. subsp. <i>flaccida</i>	Herb			√
POACEAE	<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	Graminoid			√
POACEAE	<i>Panicum maximum</i> Jacq.	Graminoid	√	√	
FABACEAE	<i>Peltophorum africanum</i> Sond.	Tree	√	√	
POACEAE	<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	Graminoid			√
ASTERACEAE	<i>Polydora cf poskeana</i> (Vatke & Hildebr.) H.Rob.sens.lat.	Herb			√
FABACEAE	<i>Pterocarpus rotundifolius</i> (Sond.) Druce subsp. <i>rotundifolius</i>	Shrub, tree	√		
VITACEAE	<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	Shrub		√	
FABACEAE	<i>Rhynchosia nitens</i> Benth. ex Harv.	Shrub		√	
ANACARDIACEAE	<i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	Tree	√	√	
ANACARDIACEAE	<i>Searsia</i> spp	Shrub, tree	√		
MALVACEAE	<i>Sida dregei</i> Burt Davy	Dwarf shrub			√
COMBRETACEAE	<i>Terminalia sericea</i> Burch. ex DC.	Tree	√	√	
POACEAE	<i>Trichoneura grandiglumis</i> (Nees) Ekman	Graminoid		√	√
RHAMNACEAE	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	Shrub, tree		√	
MORACEAE	<i>Ficus sur</i> Forssk.	Tree	√		
CHRYSOBALANACEAE	<i>Parinari curatellifolia</i> Planch. ex Benth.	Tree	√	√	
ASTERACEAE	<i>Vernonia colorata</i>	Shrub		1	

7.1.3 Wetland Habitat

A number of small tributaries of the Klein Letaba surround the site. One of the more significant tributaries runs diagonally adjacent to the south-eastern corner of the site. An in situ wetland delineation classified the site as largely terrestrial, with only one small valleyhead seep situated marginally in the south-eastern corner of the site. This seep arises from a drainage feature that bisects the site (north-south trending and offset to the east) and for the most part (289m) shows no signs of soil or vegetation wetland indicators. It is only in the last 60m before this drainage feature exits the site that soil wetland indicators become apparent. Even still, the indicators are feint and suggestive of a highly ephemeral system in the upper reaches of its catchment. On site features of the wetland are shown in **Figure 7-5** and the delineated wetland area and associated 50m buffer is depicted in **Figure 7-4**.

Wetland classification

The wetland on site was classified as a seep. Seeps are a wetland area located on gently to steeply sloping land and dominated by colluvial (i.e. gravity driven), uni-directional movement of water and material down-slope. These systems are normally associated with groundwater discharges, although flow through them may be supplemented by surface water contribution. The seep identified on site was highly temporary⁶ in nature and classified by Ollis *et al.* (2013) as a “seep without a channelled outflow”: Water exits from the seep without channelled outflow by means of a combination of diffuse surface flow, interflow, evaporation and infiltration”. The wetland classification for the wetland identified on site, according to Level 1-4 of Ollis *et al.* (2013), is given in **Table 7-4**.

Table 7-4 Level 1-4 wetland classification

LEVEL 1 TO 4 CLASSIFICATION (Ollis <i>et al.</i> , 2013)			
Level 1: System	Inland	Level 3: Landscape Unit	Seep
Level 2: Ecoregion Level 2: NFEPA – WetVeg (WVG) and Threat Status	3.01 (Lowveld) Lowveld Group 3	Level 4: Wetland HGM Type (WT) and Ecological Threat Status	Seep– Critically Endangered and Not Protected

Wetland extent

The spatial distribution of the wetland within the study site was determined using a combination of the DWAf (2005) delineation guidelines, available contour data, historical aerial imagery (Google Earth) and a desktop assessment. The extent of the wetland within the study site was small (305m²), with its source originating on site. The wetland edge was defined as the transition between terrestrial and wetland habitat using soil wetness indicators from below 50cm as per the DWAf (2005) guidelines (**Figure 7-5**).

⁶ Temporary zone of wetness: the outer zone of a wetland characterised by saturation within 50 cm of the soil surface for less than three months of year.

WETLANDS

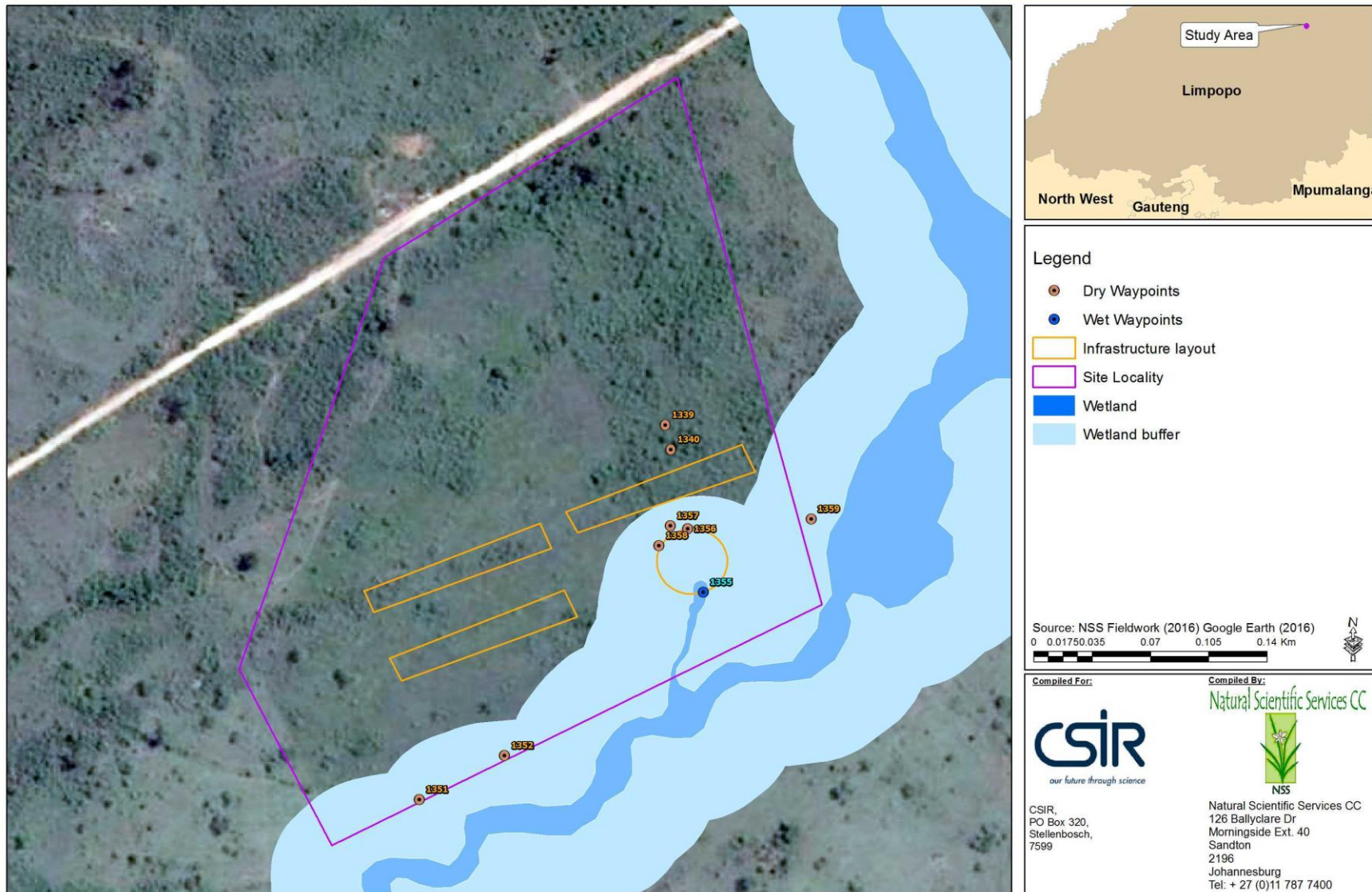


Figure 7-4 Wetland features and associated 50m buffer

Vegetation indicators were absent on site, although the site has been disturbed due to past agricultural activities. The wetland system on site does form part of a larger drainage feature in the region as highlighted in **Figure 7-4**.



Figure 7-5 **Features of the in situ wetland**

7.1.4 Conservation Important Species

It is well documented that heterogeneous landscapes, diverse geology and a range of environmental conditions, provide a diverse number of habitats for plant species (Pickett, *et.al.* 1997; O'Farrell, 2006; KNNCS, 1999). These areas are normally associated with high levels of species endemism and richness. For example, at least 74% of the 23 threatened Highveld plant taxa occur on the crests and slopes of ridges and hills (Pfab & Victor 2002). However, homogenous landscapes, either natural or that have been transformed through historical farming practices and infrastructural development contain minimal diversity and endemism. The current Study Site is over 80% transformed through agricultural disturbances and is actually underutilised in terms of grazing and fire management. Although considered a brief Vegetation Scan report, NSS has included a section on Conservation Important (CI) species that were detected or could possibly be detected on site. Within this section the CI species are discussed. These include the National Threatened Plant Species Programme (TSP) lists, any Protected species according to the Nature Conservation Ordinance (12 of 1983) and any specific Endemic or Rare species.

The Threatened Plant Species Programme (TSP) is an ongoing assessment that revises all threatened plant species assessments made by Craig Hilton-Taylor (1996), using IUCN Red Listing Criteria modified from Davis *et al.* (1986). According to the TSP Red Data list of South African plant taxa (accessed March 2016), there are 212 Red Data listed species (**Table 7-5**) out of a possible 4799 species within Limpopo Province (4.4% of the total species in the province including Data Deficient species) of which 14 species are Critically Endangered (CR), 17 Endangered (EN), 40 are Vulnerable (VU) and 21 are Near Threatened.

Table 7-5 Numbers of conservation important plant species per Red Data category within South Africa and Gauteng (date accessed: August 2016)

Threat Status	South Africa	LIMPOPO	2330AA
EX (Extinct)	28	0	0
EW (Extinct in the wild)	7	2	0
CR PE (Critically Endangered, Possibly Extinct)	57	2	0
CR (Critically Endangered)	332	14	0
EN (Endangered)	716	17	0
VU (Vulnerable)	1217	40	0
NT (Near Threatened)	402	21	2
Critically Rare (known to occur only at a single site)	153	5	0
Rare (Limited population but not exposed to any direct or potential threat)	1212	45	0
Declining (not threatened but processes are causing a continuing decline in the population)	47	19	3
LC (Least Concern)	13 856	3598	439
DDD (Data Deficient - Insufficient Information)	348	13	0
DDT (Data Deficient - Taxonomically Problematic)	904	34	1
Total spp (including those not evaluated)	23 399	4799	510

**Date accessed – August 2016

From the POSA website (2330AA QDS) as well as surrounding studies, a limited number of CI species have been recorded in the greater region (**Table 7-6**). Three species were listed as Declining, one as Data Deficient (DDT) and two as Near Threatened (NT). The one NT species, however, has a winter rainfall range and could have been captured by SANBI incorrectly. Of the remaining species, only two have the possibility to occur based on habitat preferences. These are *Adenia gummifera* (Harv.) Harms var. *gummifera* and *Elaeodendron transvaalense* (Burt Davy) R.H.Archer. Both species flower in mid summer, however, searches are not dependant on season as these plants do not retract during winter. Neither species was found during the survey.

Although no Red Listed species were recorded on the site, the Protected *Sclerocarya birrea* subsp. *caffra* occurs in the Primary woodland habitat and seedlings have been found within the Secondary habitat. This species is considered Protected under the National Forests Act 1998 (Act No 84 of 1998). Section 12(1) and Section 15(1) of the National Forests Act 1998 (Act No 84 of 1998) allows for the declaration of a tree, a group of trees, woodland or a species of trees as protected. A list of species was published under Government Notice (GN) 716 in Government Gazette (GG) 35648 of 7 September 2012. *Sclerocarya birrea* subsp. *caffra* was confirmed to occur on site. Under Section 15(1) of the National Forests Act (Act No 84 of 1998) No person may - a) cut, disturb, damage or destroy any protected tree; or b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, without a licence granted by the Minister.

Pterocarpus angolensis species are considered Protected under the Nature Conservation Ordinance, 12 of 1983 repealed by the Limpopo Environmental Management

Act, 2003 (Act No. 7 of 2003). Protected Species may not be cut, disturbed, damaged, destroyed without obtaining a permit from Limpopo Province or a delegated authority. Possible seedling of this species was found onsite.

In addition *Piliostigma thonningii* is also considered a CI species as it is highly utilised by the local people. A number of uses are listed below:

- Fresh leaves and flowers can be chewed to reduce thirst.
- Bark infusions are used to treat diarrhoea.
- Bark fibres of the fresh branches can be used to make ropes used for tying thatch roof structures and to make whips for herding goats and cattle.
- Bark consists of 18–20% tannin which is used to produce red-brown dye.
- Medicinal use: Treatment of a variety of ailments such as ulcers, and gastric and heart pains.
- Pods and seeds have been used as source of food during famine periods.
- A powder can be made from the dry pods for making nutritious porridge.
- Unripe pods can be used as a substitute for soap.
- Dry pods are roasted and ground into powder, and mixed with tobacco powder and ashes of the red-leaf *Amaranthus* to make cooking soda (alternative to bicarbonate of soda). This is used for cooking indigenous leafy vegetables such as *Corchorus* sp., *Urera tenax*, *Pouzolzia mixta* and *Grewia occidentalis*.
- It is also used as fire wood.
- It is an excellent shade tree in the savanna woodland areas.

Table 7-6 Potential CI species based on information obtained from 2527BD and 2528CA QDG as well as from surrounding studies

FAMILY	SPECIES	STATUS	FLOWERING TIME	HABITAT	LoO
PASSIFLORACEAE	<i>Adenia gummifera</i> (Harv.) Harms var. <i>gummifera</i>	Declining	December - February	Forested ravines, forest patches and forest margins, forest scrub, miombo woodland, savanna, dune forest, on stony slopes, termitaria and littoral bush, 0-1 800 m.	Possible
APIACEAE	<i>Alepidea peduncularis</i> A.Rich.	DDT		Montane grassland	Unlikely
LAURACEAE	<i>Cryptocarya transvaalensis</i> Burtt Davy	Declining	December - February	Limited to Afromontane forests up to 1700 m	Unlikely
CELASTRACEAE	<i>Elaeodendron transvaalense</i> (Burtt Davy) R.H.Archer	NT	December - April	Various soils and is found in forests, bushveld, scrub, thornveld and woodland, along streams and often on termite mounds.	Possible
GUNNERACEAE	<i>Gunnera perpensa</i> L.	Declining	October - January	It is an obligate wetland plant that grows in shallow water around the edge of pools in marshy areas or along streams.	Unlikely
PROTEACEAE	<i>Serruria nervosa</i> Meisn.	NT	July - November	Lowland Sandstone Fynbos.	No Habitat Could be an incorrect POSA entry

* Endangered – EN; Near Threatened – NT; Declining-DEC; Data Deficient Taxonomically – DDT

CONSERVATION IMPORTANT FLORAL SPECIES

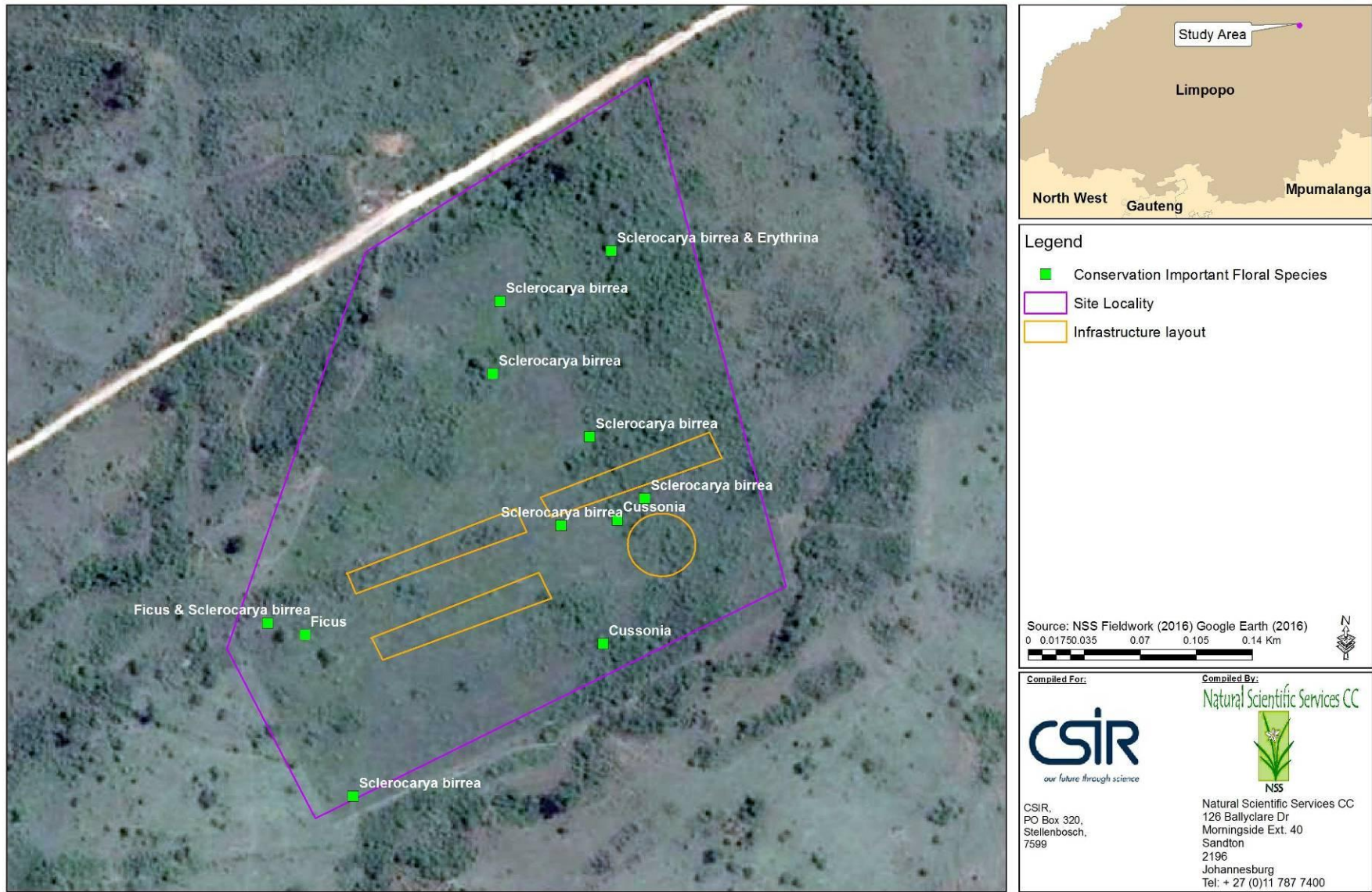


Figure 7-6 Conservation Important species on Site

7.2. Faunal Communities

The faunal species lists, which are appended under **12.1-12.7**, provide the name and conservation status of each mammal, bird, reptile, frog, butterfly, odonata (dragonfly and damselfly) and scorpion species that was recorded, or which may potentially occur in the study area. Summarized in **Table 7-7** for each major animal group (taxon) is the estimated number of species with a high or moderate likelihood of occurrence (LoO), and the names of those species with a threatened, Near Threatened or Protected status.

Table 7-7 Summary of potential faunal diversity and threatened species

TAXON	APPROXIMATE No. OF SPECIES	POTENTIAL THREATENED SPECIES
Mammals	80	VU Samango Monkey (subsp. erythrarchus) VU Southern / Northern Giant Pouched Rat VU Makwassie Musk Shrew VU Botswanan Long-eared Bat NT Southern African Hedgehog NT Water Rat NT Serval NT Lesser Long-fingered Bat NT Natal / Shreiber's Long-fingered Bat NT Rusty Pipistrelle NT Sharpe's Grysbok
Birds	230	EN Martial Eagle EN Steppe Eagle VU Secretarybird VU Lanner Falcon NT Pallid Harrier NT European Roller NT Abdim's Stork
Reptiles	86	VU Soutpansberg Worm Lizard PS Southern African Python
Frogs	22	EN Northern Forest Rain Frog
Butterflies	239	None
Odonata	19	VU Makabusi Sprite
Scorpions	11	None

7.2.1 Mammals

Approximately 80 mammal species are considered highly likely or likely to occur at least occasionally in the study area (**Appendix 12.1**). Terrestrial mammal species that are most likely to occur on site include the Striped Mouse, Single-striped Mouse, Natal Multimammate Mouse, Tete Veld Rat, Bushveld Gerbil, Reddish-grey Musk Shrew, Common Mole-rat, Scrub Hare and Slender Mongoose, among others. Larger terrestrial mammal species such as Bushpig, Porcupine, Common Duiker, and Steenbok could also occur on site at least occasionally. Arboreal mammal species such as the Tree Squirrel, Southern Lesser Galago (bushbaby), Vervet Monkey and Woodland Dormouse are also likely to

frequent the site. Bat species that are probably common in the study area include the Banana Bat, Cape Serotine, Rusty Pipistrelle, Egyptian Free-tailed Bat, Little Free-tailed Bat, and Egyptian Slit-faced Bat. Regionally-occurring mammal species that are rupicolous / rock-dwelling (e.g. hyraxes, rock elephant-shrews, and rock rabbits), water-dependent (e.g. Marsh Mongoose and otters) and/or forest-dependent (e.g. Woodland Mouse, Greater Galago, and Red Duiker), are unlikely to occur due to the absence of these habitats on site. Although various regionally-occurring bat species cannot reside on site due to lack of suitable roost habitat (e.g. caves), some species (e.g. Bushveld Horseshoe Bat and Natal Long-fingered Bat) could forage on site at least occasionally.

Apart from 13 Data Deficient (DD) mammal species including the African Striped Weasel, two bat, two elephant-shrew, two rodent, and six shrew species, the following 11 threatened mammal species were rated with a moderate LoO (*at best*) in the study area (**Table 7-7**):

- Samango Monkeys reside in high forest, forest margins and riverine gallery forest, but may forage in more open wooded near forest (Stuart & Stuart 2007) and (males especially) are known to disperse through agricultural landscapes. The nationally Vulnerable (VU) subspecies *Cercopithecus albogularis erythrarchus* is found, among other places, on the southern slopes of the Soutpansberg, and in the Masebe River Gorge on the Makgabeng Plateau to the south the Soutpansberg (Stuart & Stuart 2007). As the study site largely comprises regenerated grassland with isolated trees, Samango Monkeys are highly unlikely to reside on site. However, given the (roughly 1km) proximity of the site to forested habitat in the north, there could be sporadic visitations of foraging or dispersing individuals into the study area.
- The Giant Rat is widely distributed in sub-Saharan Africa but occurs marginally in north-eastern South Africa where the species is recognized as nationally VU. Isolated populations are known to occur in the Soutpansberg (Stuart & Stuart 2007) and although the species typically inhabits forest and woodland, it is known to occasionally enter urban areas. It was rated with a moderate LoO on site.
- The nationally VU Makwassie Musk Shrew, which is only known from a few scattered localities in eastern South Africa, has been recorded in QDS 2330AA wherein the study site is situated. Reportedly, like all shrew species in the genus *Crocidura*, the Makwassie Musk Shrew preferentially inhabits moist habitats where there is dense, matted vegetation. Although the grass is tall and dense on site, it is considered more likely that this species might occur in association with the drainage system that extends downstream past the site.
- The nationally VU Botswana Long-eared Bat is also only known from a few scattered localities in eastern South Africa (Monadjem *et al.* 2010), and there are two records of this species from QDS 2330AA wherein the study site is situated. Nothing is known about the roosting requirements of this species, but it appears to be associated with open woodland and savanna habitats near water (Monadjem *et al.* 2010). As such, it is considered most likely that this species might occur along the downstream drainage system.

- The nationally NT Southern African Hedgehog tends to avoid wet ground and requires thick, dry cover for nesting, resting by day during summer, and while in torpor during winter (Stuart & Stuart 2007). Although the site was subject to past cultivation, the grass was dense (and tall) during the mid-winter field survey. Hedgehogs were, therefore, rated with a moderate LoO.
- As its name suggests, the nationally NT African Marsh or Water Rat inhabits well-vegetated and wet habitats, and can swim well. As such, it is considered more likely that this species might occur along the downstream drainage system.
- The nationally NT and Protected Serval typically frequents dense, grassy habitat near water (Stuart & Stuart 2007), but appears to be tolerant of considerable habitat transformation (NSS pers. obs.). Given this, it is considered likely to occur at least sporadically on site.
- The nationally NT Lesser Long-fingered Bat has a narrow distribution primarily in eastern South Africa (Monadjem *et al.* 2010). It is reportedly a temperate species with the core of its distribution in the montane grasslands of the South African escarpment. According to Monadjem *et al.* (2010) the Lesser Long-fingered Bat is cave-dependent, although Stuart & Stuart (2007) state that long-fingered bats will also roost in crevices and holes in trees. At best, this species might pass through the study area when foraging or migrating between caves.
- The nationally NT Natal Long-fingered Bat is widely distributed in eastern southern Africa where it roosts often in large numbers in caves. At best, this species might pass through the study area when foraging or migrating between caves.
- The nationally NT Rusty Pipistrelle is widely distributed in sub-Saharan Africa but is limited to north-eastern South Africa. It shows a preference for savanna woodland, but African Pipistrelle's appear to be limited to areas in close proximity to open water (Stuart & Stuart 2007). Roosting occurs behind the bark of trees and in narrow rock crevices (Stuart & Stuart 2007). As open water and rock crevices are absent on site, this species was rated with a moderate LoO at best.
- The nationally NT Sharpe's Grysbok is restricted in South Africa to the north-eastern parts of the country where it requires good vegetation cover. Given that this is a highly secretive species, it is likely sensitive to disturbance. Given the proximity of the study site to human settlement, Sharpe's Grysbok was rated with a moderate LoO at best.

7.2.2 Birds

During the SABAP 1, 340 bird species were recorded in QDS 2330AA, and since commencement of the SABAP 2, 66 bird species have been recorded in pentad 2310_3010 wherein the study site is situated (SABAP 2, 2016). Based on the combined SABAP 1 and 2 bird species distribution data, an estimated 230 bird species are considered highly likely or likely to frequent, or at least fly over the site (**Appendix 12.2**).

Table 7-8 Potentially occurring threatened and Data Deficient mammal species

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (IUCN)	RSA RED LIST STATUS (Friedmann & Daly 2004)	No. OF QDS RECORDS (MammalMAP 2016)	LoO ON SITE
<i>Cercopithecus albogularis erythrarchus</i>	Samango Monkey (subsp. erythrarchus)		LC (D)	VU	1	3
<i>Cricetomys ansorgei / gambianus</i>	Southern / Northern Giant Pouched Rat		LC (S)	VU		3
<i>Crociodura maquassiensis</i>	Makwassie Musk Shrew		LC (U)	VU	1	3
<i>Laephotis botswanae</i>	Botswanan Long-eared Bat		LC (U)	VU	2	3
<i>Atelerix frontalis (frontalis)</i>	Southern African Hedgehog		LC (S)	NT		3
<i>Dasymys capensis / incomatus</i>	Water Rat		LC (U)	NT		3
<i>Leptailurus serval</i>	Serval	PS	LC (S)	NT		3
<i>Miniopterus fraterculus</i>	Lesser Long-fingered Bat		LC (U)	NT		3
<i>Miniopterus natalensis / shreibersii</i>	Natal / Shreiber's Long-fingered Bat		LC (U)	NT		3
<i>Pipistrellus rusticus</i>	Rusty Pipistrelle		LC (U)	NT	2	3
<i>Raphicerus sharpei</i>	Sharpe's Grysbok	PS	LC (S)	NT		3
<i>Crociodura cyanea</i>	Reddish-gray Musk Shrew		LC (S)	DD	5	2
<i>Crociodura hirta</i>	Lesser Red Musk Shrew		LC (U)	DD	1	2
<i>Crociodura mariquensis</i>	Swamp Musk Shrew		LC (U)	DD		3
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant Shrew		LC (U)	DD		2
<i>Elephantulus intufi</i>	Bushveld Elephant Shrew		LC (S)	DD		3
<i>Epomophorus (gambianus) crypturus</i>	Gambian Epauletted Fruit Bat		LC (U)	DD		2
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil		LC (S)	DD		2
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat		LC (D)	DD	4	3
<i>Lemniscomys rosalia</i>	Single-Striped Lemniscomys		LC (S)	DD		2
<i>Myosorex cafer</i>	Dark-footed Mouse Shrew		LC (U)	DD	1	2
<i>Poecilogale albinucha</i>	African Striped Weasel		LC (U)	DD		3
<i>Suncus infinitesimus</i>	Least Dwarf Shrew		LC (U)	DD	1	2
<i>Suncus lixus</i>	Greater Dwarf Shrew		LC (U)	DD		2

Status: D = Declining; DD = Data Deficient; LC = Least Concern; NT = Near Threatened; PS = Protected Species; S = Stable; VU = Vulnerable; U = Unknown
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate
Sources: Friedmann & Daly (2004); Stuart & Stuart (2007); Monadjem *et al.* (2010); MammalMAP (2016)

Table 7-9 Potentially occurring threatened bird species

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Eagle, Martial	<i>Polemaetus bellicosus</i>	EN	VU	EN	Yes		3
Eagle, Steppe	<i>Aquila nipalensis</i>		EN	LC	Yes		3
Secretarybird	<i>Sagittarius serpentarius</i>		VU	VU	Yes		3
Falcon, Lanner	<i>Falco biarmicus</i>		LC	VU	Yes		3
Harrier, Pallid	<i>Circus macrourus</i>		NT	NT	Yes		3
Roller, European	<i>Coracias garrulus</i>		LC	NT	Yes		3
Stork, Abdim's	<i>Ciconia abdimii</i>		LC	NT	Yes		3

Status: EN = Endangered; LC = Least Concern; NT = Near Threatened; VU = Vulnerable
Likelihood of Occurrence (LoO): 3 = Moderate
Sources: Taylor *et al.* (2015); BirdLife South Africa (2016); SABAP 2 (2016)



Due to the absence of aquatic habitat on site, the list of 230 bird species only includes a few waterbird species that are known to also forage away from water (e.g. Brown-hooded Kingfisher, Black-headed and Grey herons, African Marsh and Pallid harriers). Bird species which exclusively inhabit rocky or forested habitats are not expected to occur due to the absence of these habitats on site. Of the bird species that were detected during the brief site visit, the majority represent arboreal frugivores, insectivores and nectivores (e.g. barbets, greenbuls and sunbirds). The following seven threatened bird species (none of which have to date been recorded in pentad 2310_3010), were rated with a moderate LoO on site, at best.

- The Martial Eagle is listed as Endangered (EN) under the NEM:BA ToPS (2015), and as globally VU and regionally EN (Taylor *et al.* 2015). It is widely distributed in sub-Saharan Africa including South Africa, but has undergone rapid declines owing to deliberate and indirect poisoning, habitat loss, prey declines and collision with power lines, among other things (BirdLife International 2016). Martial Eagles inhabit open woodland, savanna and grassland where they can find sufficient large prey and trees for nesting. Although this species is unlikely to nest on site, it could occasionally forage over the study area.
- The globally EN Steppe Eagle has a very wide global distribution range but has undergone extremely rapid population declines in Eurasia due to habitat loss, persecution and collision with power lines. Steppe Eagles overwinter in open habitats in southern Africa, where they feed primarily on termites and Red-billed Quelea. As such, this species could potentially forage in the study area.
- The globally VU Secretarybird, which is also listed on CITES Appendix II, inhabits open grassland to lightly wooded savanna, and is also found in agricultural areas. Recent evidence from across its sub-Saharan range suggests that this species is experiencing a rapid decline owing to habitat degradation, disturbance, hunting and capture for trade (BirdLife International 2016). Secretarybirds are sensitive to disturbance, and given the increasing prevalence of human settlement in the region, this species might rarely frequent the study area.
- The regionally VU Lanner Falcon inhabits a high diversity of habitats in Africa and southern Europe, where populations have declined from persecution and collection of eggs and chicks (BirdLife International 2016). They mainly use the nests of other birds for breeding, and prey primarily on small birds. Although Lanner Falcons could forage in the study area, they are not expected to breed on site as no large bird nests were found.
- The Pallid Harrier has a large Eurasian breeding range and African non-breeding range but has recently been listed globally and regionally NT. It is also listed on CITES Appendix II. Within its non-breeding range the Pallid Harrier is mainly threatened by poisoning from pesticides and rodenticides, and transformation of grassland by fire and overgrazing. It was rated with a moderate LoO in the study area.
- The regionally NT Roller also has a large Eurasian breeding range and African non-breeding range, and is mainly threatened by persecution during migration, and habitat loss. In South Africa this species inhabits savanna, and as such it was rated with a moderate LoO.



- The regionally NT Abdim's Stork is an intra-African migrant. It overwinters in southern Africa where it frequents open grassland, pastures, areas of cultivation and savanna woodland, often near water (BirdLife International 2016). The species is potentially threatened by habitat loss from agriculture and urbanization, as well as poisoning and trade. It was rated with a moderate LoO in the study area.

7.2.3 Reptiles

Approximately 86 reptile species, representing mostly snakes and lizards, are considered highly likely or likely to occur in the study area at least occasionally (**Appendix 12.3**). Based on our field observations and ReptileMAP's (2016) records from QDS 2330AA, on site the most frequently encountered reptile species are likely to include Common Dwarf Gecko, Distant's Ground Agama, Southern Tree Agama, Variable and other skink species. Regionally-occurring rupicolous reptiles (such as flat and girdled lizards) and water-associated reptiles (e.g. Marsh Terrapin and Nile Monitor) are unlikely to occur due to the absence of water and rocky habitat on site. Termitaria may provide important habitat for blind snakes, thread snakes and worm lizards, among others. Of the 86 listed reptile species, two are formally threatened or protected.

- The globally VU Soutpansberg Worm Lizard is restricted to the Soutpansberg, where it inhabits sandy Kalahari soils, entering mopane woodland on clay soils. It burrows in loose soil, and is usually found beneath stones or rotting logs. Termites form the bulk of this species' diet. Given the habitat conditions on site, and considering that it was subject to past cultivation, this species was rated with a moderate LoO at best.
- The nationally Protected Southern African Python occurs throughout north-eastern South Africa, and there are two records of this species from QDS 2330AA where in the study site is situated (ReptileMAP 2016). Pythons are usually found in open savanna especially in association with rocky and riverine areas (Branch 1998). As such, although this species might occasionally frequent the site, it is more likely to be found in nearby rocky and riverine habitats.

7.2.4 Frogs

Twenty-two frog species are considered highly likely or likely to occur in the study area, at least occasionally (**Appendix 12.4**). As there is no permanent or seasonal flowing or standing body of water on site, only frog taxa that breed terrestrially (such as rain frogs and shovel-nosed frogs) or in very shallow ephemeral water (such as Boettger's Caco and sand frogs) could potentially breed on site after significant rain. Some additional taxa (such as the toads and African Bullfrog), which are able to move large distances overland whilst foraging, dispersing or searching for suitable shelter, might also occur on site, at least occasionally. Of the 22 potentially occurring frog species, only one is listed as threatened.

- The globally EN Northern Forest Rain Frog is confined to the Afromontane Forest and adjacent North-eastern Mountain Grassland in Limpopo Province (Du Preez & Carruthers 2009), and there is a record of this species in QDS 2330AA wherein the study site is

situated (FrogMAP 2016). “Calling males have also been encountered in disturbed habitats such as wooded parks and gardens, and in pine plantations on the fringe of indigenous forest” (Minter *et al.* 2004). Breeding occurs from the first spring rains (September or October) until early December, which involves the excavation of a network of shallow, horizontal subterranean tunnels and chambers where the eggs are laid (Du Preez & Carruthers 2009). Considering that the site was subject to historical cultivation, which would have greatly disturbed many native subterranean and terrestrial burrowing species, the Northern Forest Rain Frog was rated with a moderate LoO. The Northern Forest Rain Frog is under increasing threat from habitat loss and fragmentation due to afforestation and other agricultural practices. These activities also impact negatively on the quality of the remaining habitat by reducing the quantity of surface and soil water and altering natural fire regimes in adjacent areas. Road construction and collision of these frogs with road traffic is also problematic. To ascertain whether or not this species is present on site, active searching and pitfall trapping along drift fences could be performed once the site has received significant summer rain.

7.2.5 Butterflies

A very high richness of potentially 239 butterfly species is considered highly likely or likely to occur in the study region (**Appendix 12.5**). Considering, however, that the study site was subject to past cultivation and currently comprises regenerated grassland with isolated trees, only approximately 68 butterfly species (28%) are considered highly likely to occur on site. Many of the 173 species with a moderate LoO in the study area are primarily associated with forest and wooded habitat, and are likely to occur only occasionally or sporadically on site. Of the 239 listed species, none are listed as threatened or protected species. Two regionally-occurring threatened butterfly species are, however, worth mentioning.

- The Axehead Orange is widely distributed in eastern southern Africa but was only recently discovered in South Africa in the eastern part of the Soutpansberg. The South African population is listed as regionally Critically Endangered (Mecenero *et al.* 2013). Adults in South Africa have only been seen on the wing in December, and reportedly “prefer to fly in shady spots, resting on grass stems in the shade of trees, as well as on the ground or on rocks in the shade of trees” (Mecenero *et al.* 2013). Nothing much else is known about the biology of this species except that larvae feed on *Brachystegia* trees. As no *Brachystegia* were seen, this butterfly species is considered unlikely to occur on site.
- The globally EN Induna or Soutpansberg *Acraea* is restricted to the Soutpansberg where it inhabits exposed high rocky ridges in mountain sourveld where the larval host plant *Aeschynomene nodulosa* grows. Although there are three records of this species from QDS 2330AA wherein the study site is situated (LepiMAP 2016), this butterfly species is unlikely to occur on site as suitable habitat for it is absent.

7.2.6 Odonata

As there is no significant body of water on site, a very low diversity of odonatan species is likely to occur. Only the following three regionally-occurring odonatan species were rated with a high likelihood of occurrence. The Nomad inhabits grassy and reedy margins of pools and dams, but can sometimes be found in grassland far from water. The Pantala breeds in warm, grassy ephemeral pools and is usually seen away from water, especially in savanna. The Marsh Bluetail is highly tolerant of disturbed conditions and may be present at stagnant and trampled livestock watering points. Sixteen additional odonatan species were rated with a moderate LoO *at best*. These include e.g. the Blue Basker, Common Citril, Common Threadtail, Julia Skimmer, Kirby's Dropwing, Slate Sprite, Southern Banded Groundling and Two-banded Cruiser, which have all been recorded in QDS 2330AA wherein the study site is situated (OdonataMAP 2016). Of the 19 odonatan species that potentially occur in the greater study area, most have a Biotic score of 2 or less (**Appendix 12.6**). Samways' (2008) Biotic Index is "based on three criteria: geographical distribution, conservation status and sensitivity to change in habitat. It ranges from a minimum of 0 to a maximum of 9. A very common, widespread species which is highly tolerant of human disturbance scores 0. In contrast, a range-restricted, threatened and sensitive endemic species scores 9." Listed species with a Biotic score of 4 include the Makabusi and Sudan sprites. Only the Goldtail, which has been recorded in QDS 2330AA (OdonataMAP 2016), has a Biotic score of 5. Given the study site's historical disturbance (cultivation), and lack of open water, these sensitive odonatan species might only pass sporadically through the area.

- The nationally VU Makabusi Sprite is localized in South Africa to Limpopo Province where it is typically found amidst tall grass and reeds at the margins of bush-fringed and sluggish reaches of streams or rivers. Although the Makabusi Sprite has been recorded in QDS 2330AA wherein the study site is situated, this species was rated with a moderate LoO at best and, more likely, might occur further downstream along the local drainage system. Afforestation and overgrowth from invasive alien trees and bushes present the greatest threats to this species (Samways 2006).

7.2.7 Scorpions

Eleven scorpion species potentially occur in the study area (**Appendix 12.7**). Six scorpion species were rated with a high LoO and include *Parabuthus transvaalicus*, *Pseudolychas pegleri*, *Uroplectes olivaceus*, *Uroplectes triangulifer*, *Uroplectes vittatus* and *Opisthophthalmus glabrifrons*. Five scorpion species were rated with a moderate LoO and include *Parabuthus mossambicensis*, *Uroplectes carinatus*, *Cheloctonus jonesii*, *Opistacanthus asper* and *Opistacanthus validus*. Highly rupicolous scorpions (such as members of the genus *Hadogenes*) are unlikely to occur due to the absence of rocky habitat on site. None of the potentially occurring scorpion species has a threatened or protected status.

8. Areas of Significance

The site significance assessment, which includes a significance map for terrestrial biodiversity on the site, was based on the findings from the ecological scan, as well as relevant international, national and provincial planning and other biodiversity conservation initiatives as described below.

8.1. International Areas of Conservation Significance

The site does not fall into any proclaimed:

- *Ramsar Site.*
- *World Heritage Site.*
- *Important Bird Area (IBA).*

8.2. National and Regional Areas of Conservation Significance

As inferred earlier in this report, a number of biodiversity features with recognised national or provincial conservation importance, require consideration.

8.2.1 Terrestrial Priority Areas & Threatened Ecosystems

The Terrestrial Component (Rouget *et al.* 2004) of the National Spatial Biodiversity Assessment integrated data on species, habitats and ecological processes to identify areas of greatest terrestrial biodiversity significance. This resulted in the identification of nine spatial terrestrial Priority Areas, which represent high concentrations of biodiversity features and/or areas where there are few options for meeting biodiversity targets. The proposed development is situated in the **North Eastern Escarpment Priority Area (Figure 8-1)**.

A list of Threatened Ecosystems within each terrestrial Priority Area was gazetted on 9 December 2011 under the NEM:BA (Act 10 of 2004). The Threatened Ecosystems occupy 9.5% of South Africa, and were selected according to six criteria which included: (1) irreversible habitat loss; (2) ecosystem degradation; (3) rate of habitat loss; (4) limited habitat extent and imminent threat; (5) threatened plant species associations; and (6) threatened animal species associations. The site falls within the **Tzaneen Sour Bushveld Threatened Ecosystem (Figure 8-1)**.

8.2.2 Freshwater Ecosystem Priority Areas

The South African National Biodiversity Institute (SANBI), in collaboration with Department of Water Affairs (DWA), Department of Environmental Affairs (DEA), Water Research Commission (WRC), South African National Parks (SANParks), Worldwide Fund for Nature (WWF), Council for Scientific and Industrial Research (CSIR), South African Institute for Aquatic Biodiversity (SAIAB) and the National Research Foundation (NRF) have prioritised Freshwater systems in the country with an aim to incorporate conservation into Catchment Management Strategies (Nel *et al.* 2011). Spatial data from the National Freshwater Ecosystem Priority Areas project indicate

that there is no river or wetland Freshwater Ecosystem Priority Area (FEPA) in or nearby the site (**Figure 8-2**).

8.2.3 Limpopo Sector / C-Plan

According to the Limpopo Sector / Conservation Plan, the study site is situated on land where there is “no remaining natural habitat”. The north-western corner of the site is, however, adjacent to a Critical Biodiversity Area (**Figure 8-3**). CBA’s “*are the portfolio of sites that are required to meet the region's biodiversity targets, and need to be maintained in the appropriate condition for their category.*” The specific CBA represents a Landscape Corridor, which provides a linkage to/from the Soutpansberg. Landscape Corridors provide the best landscape connectivity to support and enable biodiversity to adapt to the impacts of climate change. The Landscape Corridor extends south-eastwards as a Local Corridor, which approaches within ca. 300m of the south-western corner of the site. Local corridors represent “*fine scale connectivity pathways that contribute to connectivity between climate change focal areas.*”

8.3. Local Areas of Conservation Significance

The conservation significance of local biodiversity was rated and mapped based on:

- Ecological sensitivity (including renewability/success for rehabilitation);
- Level/Extent of disturbance.
- Presence of CI species (identified at the vegetation unit/habitat level); and
- Conservation value (at a regional, national, provincial and local scale).

Identified habitat units within the study site were ranked into **High**, **Medium-high**, **Medium**, **Medium-low** or **Low** classes in terms of significance. This was undertaken according to a sensitivity-value analysis (scoring in **Table 8-1**) and included input based on knowledge of the area, on the ground investigations and experience when dealing with ecological systems and processes. A summary overview of scoring the Areas of Local Conservation Significance is presented in **Table 8-2** and illustrated in **Figure 8-4**.

Table 8-1 Scoring Range for the Areas of Significance

Category	Scoring Range	
	Upper	Lower
High	15	11.1
Moderate - High	11	7.1
Moderate	7	3.1
Moderate - Low	3	-0.9
Low	-1	-5

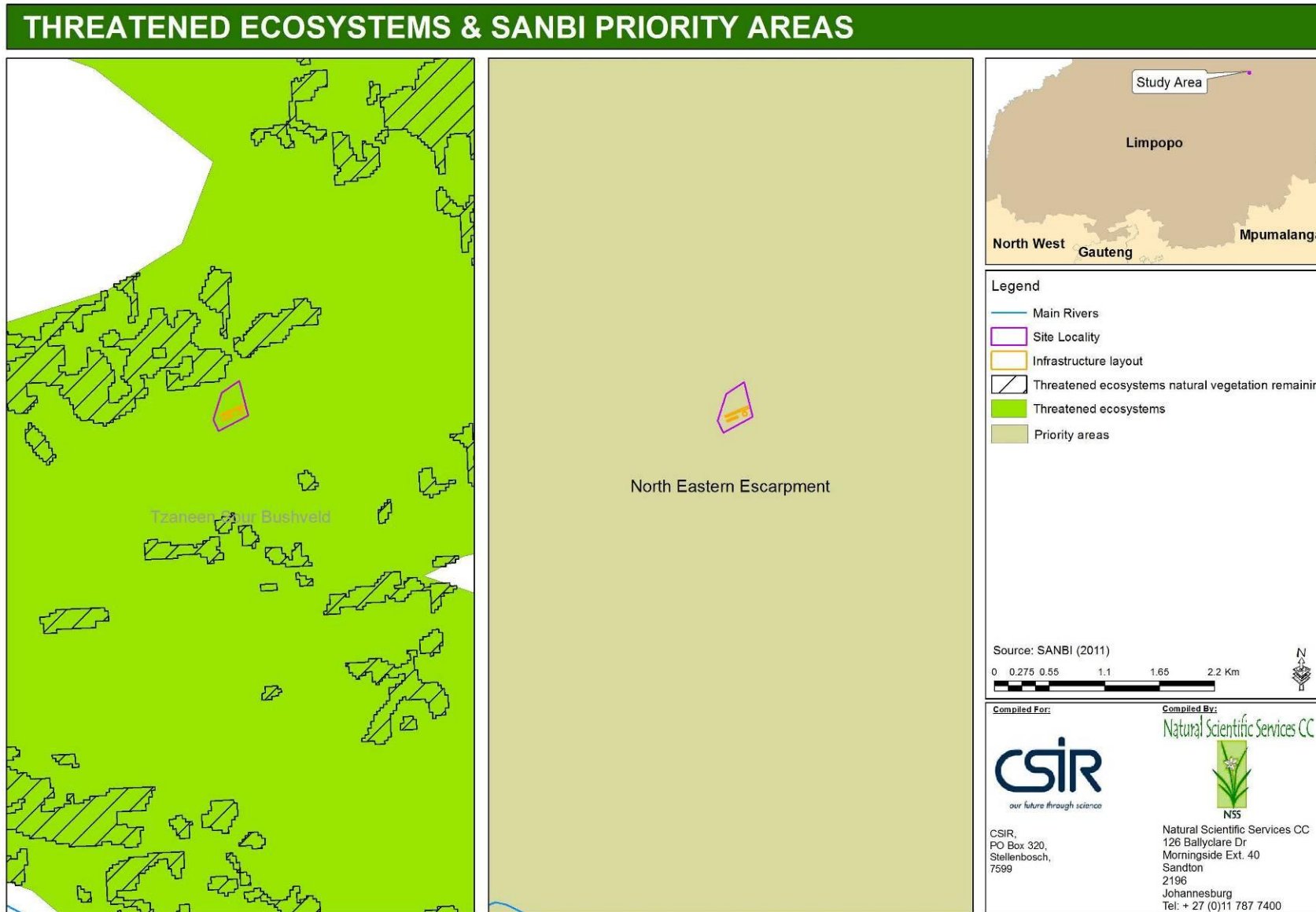


Figure 8-1 Terrestrial Priority Area and Threatened Ecosystem wherein the study site is situated

NFEPA RIVERS & WETLANDS

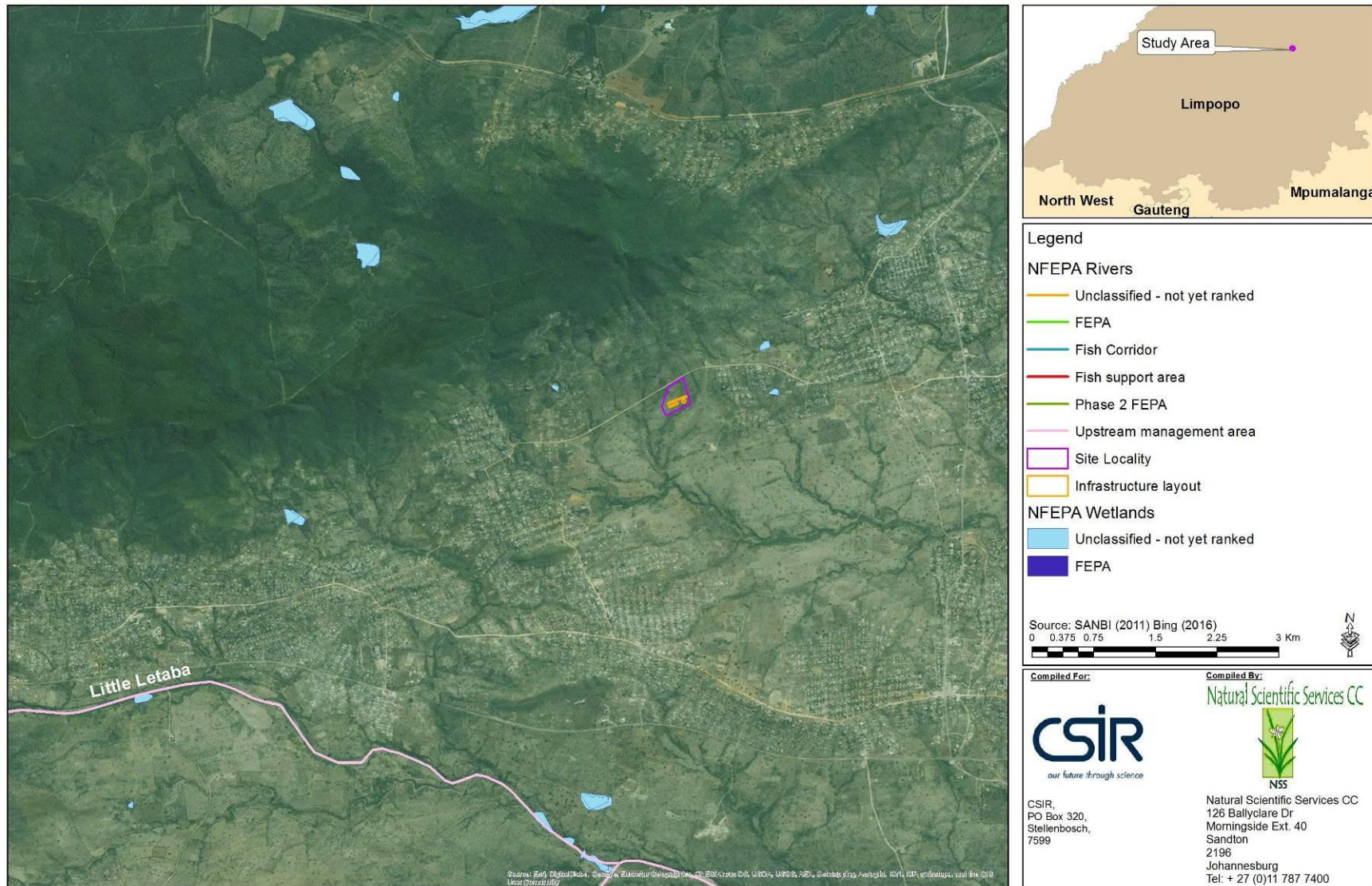


Figure 8-2 Classification of regional rivers and wetlands under the NFEPA

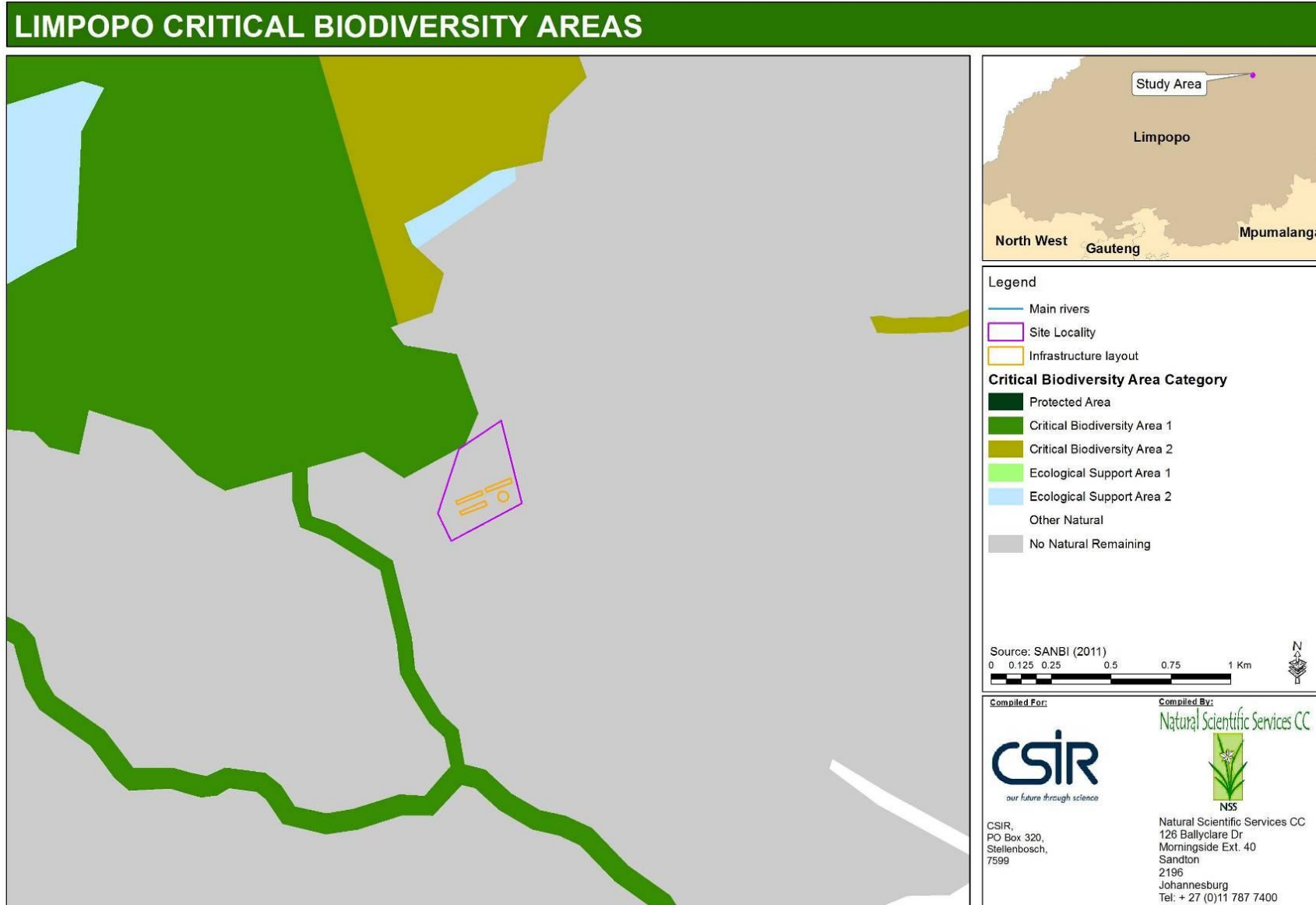


Figure 8-3 Location of the site in the context of the Limpopo Sector / C-Plan

Table 8-2 Descriptions and ratings of the various Areas of Significance

Vegetation Type	Ecological Sensitivity (Rating 1-5)	Conservation Value (Rating 1-5)	Presence of CI species* (Rating 1-5)	Level/Extent of Disturbance (Rating -1-5)	Total Score
Woodland / Bushveld Habitats					
Primary Woodland	Moderate - High (4)	Situated in: <ul style="list-style-type: none"> A SANBI Priority Zone the Endangered Threatened Ecosystem Moderate-high Species Richness of all the units and contains Protected Tree species under the Forest Act. Unit is approximately 18% of the Study Site (4)	Protected Tree Species Potential for Protected Southern African Python (3)	<ul style="list-style-type: none"> Limited Alien Invasives Past farming disturbances –edge effects into these patches Cutting of larger significant <i>Ficus</i> trees evident. Under utilization of the habitat evident (-1)	Medium-High (10)
Secondary Woodland	Moderate (3)	Situated in: <ul style="list-style-type: none"> A SANBI Priority Zone the Endangered Threatened Ecosystem Moderate Species Richness of all the units and contains Protected Tree species under the Forest Act. Unit is approximately 45% of the Study Site (3)	Young Protected Tree Species Potential for Protected Southern African Python (2)	<ul style="list-style-type: none"> Limited Alien Invasives Past farming disturbances creating a pioneer habitat with significant growth of species such as <i>Piliostigma</i> Under utilization of the habitat evident (-1)	Medium
Wetland System					
Wetland System	High (5)	Situated in: <ul style="list-style-type: none"> A SANBI Priority Zone the Endangered Threatened Ecosystem Protected under National Water Act (NWA; Act 36 of 1998) (5)	Young Protected Tree Species Potential for Protected Southern African Python (3)	<ul style="list-style-type: none"> Limited Alien Invasives Past farming upslope, however, vegetation has recovered well. Limited erosion evident (-1)	High (12)
Transformed (Habitat In Recovery)					
<i>Hyperthelia</i> Grasslands (Previously Farmed Area)	Medium-Low (2)	Situated in: <ul style="list-style-type: none"> A SANBI Priority Zone the Endangered Threatened 	Unlikely (1)	<ul style="list-style-type: none"> limited Alien and Invasives present Susceptible to further alien invasions 	Medium - Low (3)



Vegetation Type	Ecological Sensitivity (Rating 1-5)	Conservation Value (Rating 1-5)	Presence of CI species* (Rating 1-5)	Level/Extent of Disturbance (Rating -1-5)	Total Score
		Ecosystem Limited Species richness and diversity Still within recovery – not yet a climax system (2)		■ Under utilization of the habitat evident (-2)	



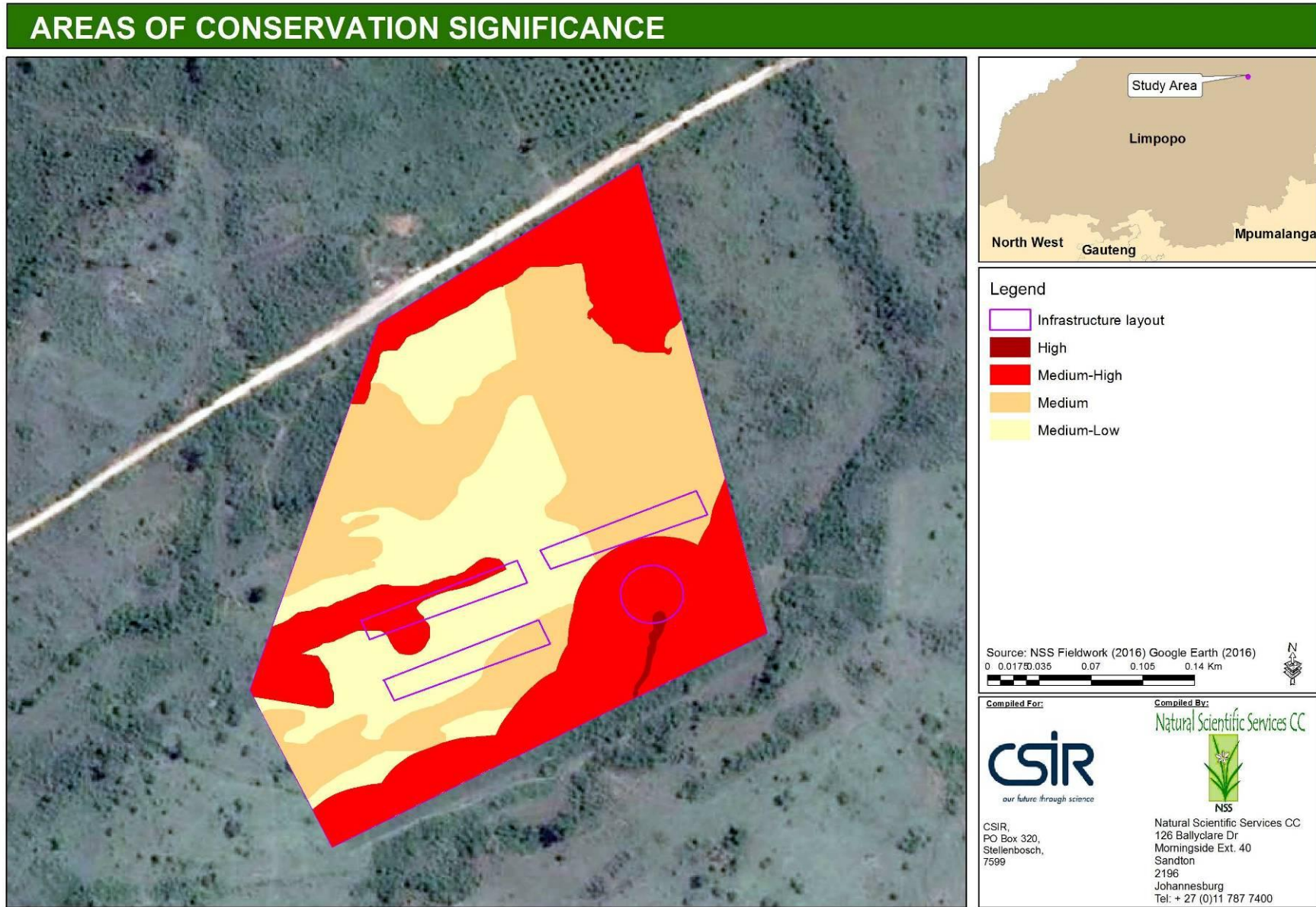


Figure 8-4 Local Areas of Conservation Significance

9. Impact Assessment & Recommendations

Potential impacts of the proposed project on biodiversity are summarized in **Table 10-1**, and briefly discussed below, followed by recommended measures to mitigate these during relevant phases of the development.

9.1. Impacts

9.1.1 *Loss of seep, and deterioration of downstream wetland drivers*

Construction of the chicken facility according to the proposed layout shown in **Figure 1-1** will result in the direct loss of 0.0057ha of transitional seep wetland habitat. In addition, downstream wetland drivers could be impacted upon by clearing of vegetation and earth-moving activities during construction affecting sediment loads, increased hardened surfaces during operation increasing the land's susceptibility to erosion. The site is on a slight slope which therefore increases the probability of erosion. This needs to be considered during construction where some combination of terracing, retaining walls, and special foundation and drainage techniques may be needed. If managed correctly, these impacts are considered to have a limited and short term impact on local terrestrial and wetland habitat.

9.1.2 *Loss of terrestrial vegetation and faunal habitat*

Construction of the chicken facility according to the proposed layout shown in **Figure 1-1** will result in destruction of a portion of all habitats found onsite (**Figure 7-3**). Given the transformed nature of the Secondary Woodland and the *Hyperthelia* communities and the limited extent of the proposed development, their loss was rated with low significance. There would also be a small loss in Primary Woodland. This is rated with a medium significance.

9.1.3 *Loss of CI or medicinal flora*

Observed (*Sclerocarya birrea* subsp. *caffra*) and potentially occurring conservation important (CI) or medicinal plant species could be lost as a result of vegetation clearing during construction, and increased traffic and human harvesting during all phases of the development. However, given the transformed nature of the site and the limited extent of the proposed development, this potential impact was rated with low significance.

9.1.4 *Loss of CI fauna*

The destruction of natural habitat with construction of the proposed chicken facility is expected to affect small subterranean / fossorial / terrestrial animals the most. Potentially occurring CI faunal species, which are most likely to be lost with earth-moving activities include the globally EN Northern Forest Rain Frog, globally VU Soutpansberg Worm Lizard, and nationally NT Southern African Hedgehog. Taking into consideration the historical disturbance of the site, the limited extent of the proposed development, and that the aforementioned species were rated with a moderate LoO (at best), this potential impact was rated with medium significance.

9.1.5 Introduction and proliferation of alien plant species

Within the region, alien plants that are considered a common problem include *Solanum mauritianum*, *Melia azedarach*, and *Caesalpinia decapetala*. The subtropical climate is also conducive to the spread of *Chromolaena odorata*, *Lantana camara* and *Psidium guajava*.

From the field investigation, limited distributions in alien species was evident. However, this may change during all phases of the project, particularly with an expected increase in annual (herbaceous) species. This could occur due to the importation of alien seeds within construction materials such as building soil, with the influx of vehicles (seeds within tyre tread) and people as well as fodder (containing invasive alien plant seeds). This potential impact was rated with medium significance without any control measures in place.

9.1.6 Sensory disturbance of fauna

Sensory disturbance of fauna from noise, dust and light pollution will cause many fauna to vacate the site, at least temporarily during construction and decommissioning. Animals that would be most adversely affected include calling and/or secretive nocturnal species. Less sensitive common species are likely to tolerate low levels of noise and light pollution, and some species may even benefit - such as bats and frogs, which may forage on insects attracted to lights.

9.1.7 Environmental contamination

Various contaminants are present in chicken effluent including nutrients, pathogens, veterinary pharmaceuticals (including inter alia antibiotics), and naturally excreted hormones. During operation and decommissioning, inappropriate slurry management and improper disposal of carcasses as well as excess fodder, chemicals (e.g. pesticides) and any other operational waste could cause contamination / eutrophication of soils and eventually result in the contamination of lower-lying land. In addition, as the site is on a slope, specific measures to prevent run-off downslope will need to be implemented.

9.1.8 Poor / Inappropriate control of animal pests

During operation, substandard animal husbandry / hygiene and waste generation in the form of chicken effluent and excess fodder could facilitate aggregation and/or breeding of invertebrate pests such as flies, weevils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc.

Poor waste management and hygiene practices also have the potential to attract vertebrate pests including rodents (Black Rat, House Mouse), mammalian Carnivores (Black-backed Jackal, dogs, cats) and birds (Common Myna, Pied Crow, Sacred Ibis). Proliferation of alien pest species could adversely affect indigenous fauna through competition, predation and disease transmission, and inappropriate poisoning of pests could affect non-target predatory animals (including various potentially occurring CI bat, bird, reptile, and frog species).

9.1.9 Disease transmission

Diseases could be transmitted either directly from chickens and their effluent, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of native fauna in the surrounding area.

9.1.10 Altered burning

The development could result in an increase or decrease in wild fires in the study area. Although fires might be unintentionally ignited with carcass burning, for example, it is more likely that burning will be prohibited for human and infrastructural safety. Lack of fire will eventually cause local vegetation to become more woody. Although this might disadvantage grassland-associated CI fauna such as the hedgehog and Secretarybird, it could benefit savanna- and forest-associated CI fauna such as the EN Northern Forest Rain Frog, VU Samango Monkey and NT Sharpe's Grysbok.

9.2. Management and Mitigation Recommendations

Recommended management and mitigation measures are detailed in **Table 10-2**. With successful implementation of the recommended measures, the significance of impacts can be reduced to **Low**, as highlighted in

Table 9-1.

Table 9-1 Summary of impact significance, without and with mitigation

POTENTIAL IMPACTS	SIGNIFICANCE	
	Without mitigation	With mitigation
CONSTRUCTION		
<i>Loss of seep, and deterioration of downstream wetland drivers</i>	High	Low
<i>Loss of terrestrial vegetation and faunal habitat</i>	Medium	Low
<i>Loss of CI or medicinal flora</i>	Medium	Low
<i>Loss of CI fauna</i>	Medium	Low
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Sensory disturbance of fauna</i>	Medium	Low
OPERATION		
<i>Environmental contamination</i>	High	Low
<i>Poor / Inappropriate control of animal pests</i>	High	Low
<i>Disease transmission</i>	Medium	Low
<i>Altered burning</i>	Medium	Low
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Loss of CI or medicinal flora</i>	Low	Low
<i>Sensory disturbance of fauna</i>	Medium	Low
DECOMMISSIONING		
<i>Introduction and proliferation of alien species</i>	High	Low
<i>Deterioration of downstream wetland drivers (increased erosion and run-off)</i>	Medium	Low
<i>Sensory disturbance of fauna</i>	Low	Low

10. Concluding Remarks

With the implementation of the mitigation measures suggested in this report, the significance of impacts on site can be reduced to **Low**. Based on our site visit and the information that was available to date, it is NSS's opinion that there are no fatal flaws to the project. If the recommended mitigation measures are implemented, NSS has no objection to the project going forward. *Most importantly, the drainage system that flows through the south-eastern corner of the site will need to be protected from disturbance. This will require the repositioning of the fresh water reservoir to the north of the site and within the Medium-Low significant areas. If the developer would like to develop on the wetland a water use licence will be required.*

Table 10-1 Impact Assessment

POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT	SCORE	DURATION	SCORE	INTENSITY	SCORE	REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	SCORE	SIGNIFICANCE		CONFIDENCE	
													RATING	SCORE	RATING	SCORE
CONSTRUCTION																
<i>Loss of seep, and deterioration of downstream wetland drivers</i>																
Construction of the chicken facility according to the current proposed layout will result in the direct loss of 0.0057ha of transitional seep wetland habitat. In addition, downstream wetland drivers could be impacted by increased erosion during construction thereby increasing sediment loads and increased run-off through hardened surfaces	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Moderate reversibility	Moderate irreplaceability	Definite (>90% chance)	1	High	10	High	3
	With	Neutral	Site specific	1	Temporary (<2 years)	1	Low	1	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
<i>Loss of terrestrial vegetation and faunal habitat</i>																
Construction of the chicken facility according to the current proposed layout will result in destruction of the secondary woodland areas and <i>Hyperthelia</i> grasslands, with some of the Primary woodland being removed.	Without	Negative	Site specific	1	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Moderate irreplaceability	Highly probable (50-90% chance)	0,75	Medium	4	High	3
	With	Negative	Site specific	1	Long term (>15 years)	4	Low	1	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	2	Medium	2
<i>Loss of CI or medicinal flora</i>																
Observed and potentially occurring conservation important (CI) or medicinal plant species could be lost as a result of vegetation clearing and increased traffic and human harvesting.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Moderate irreplaceability	Highly probable (50-90% chance)	0,75	Medium	2	High	3
	With	Negative	Site specific	1	Temporary (<2 years)	1	Low	1	Moderate reversibility	Moderate irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
<i>Loss of CI fauna</i>																
The destruction of natural habitat with construction of the proposed chicken facility is expected to affect small subterranean / fossorial / terrestrial animals the most. Potentially occurring CI faunal species, which are most likely to be lost with earth-moving activities, include the globally EN Northern Forest Rain Frog, globally VU Soutpansberg Worm Lizard, and nationally NT Southern African Hedgehog.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Irreversible	Moderate irreplaceability	Highly probable (50-90% chance)	0,75	Medium	8	Medium	2
	With	Negative	Site specific	1	Short term (2-5 years)	2	Low	1	High reversibility	Moderate irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
<i>Introduction and proliferation of alien species</i>																
An increase in invasive alien flora, particularly annual (herbaceous) species, is likely to occur with the influx of vehicles, people and construction materials, especially where the site is disturbed, and in the absence of any control measures.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Low reversibility	Low irreplaceability	Definite (>90% chance)	1	High	10	High	3
	With	Negative	Site specific	1	Temporary (<2 years)	1	Low	1	Moderate reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	2	Medium	2
<i>Sensory disturbance of fauna</i>																
Sensory disturbance of fauna from noise, dust and light pollution will cause many fauna to vacate the site, at least temporarily during construction. Animals that would be most adversely affected include calling and/or secretive nocturnal species.	Without	Negative	Local (<2km from site)	2	Short term (2-5 years)	2	High	8	High reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	Medium	9	High	3
	With	Negative	Site specific	1	Short term (2-5 years)	2	Medium-low	2	High reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	3	High	3
OPERATION																



POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT RATING	SCORE	DURATION RATING	SCORE	INTENSITY RATING	SCORE	REVERSIBILITY RATING	IRREPLACEABILITY RATING	PROBABILITY RATING	SCORE	SIGNIFICANCE RATING	SCORE	CONFIDENCE RATING	SCORE
Environmental contamination																
Various contaminants are present in chicken effluent including nutrients, pathogens, veterinary pharmaceuticals (including inter alia antibiotics), and naturally excreted hormones. During operation, inappropriate slurry management and improper disposal of carcasses as well as excess fodder, chemicals (e.g. pesticides) and any other operational waste could cause contamination / eutrophication of soils and eventually result in the contamination of lower-lying land.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	High	8	Low reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	High	11	Low	3
	With	Negative	Local (<2km from site)	2	Short term (2-5 years)	2	Low	1	High reversibility	Moderate irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
Poor / Inappropriate control of animal pests																
During operation, substandard animal husbandry / hygiene and waste generation in the form of chicken effluent and excess fodder could facilitate aggregation and/or breeding of invertebrate pests such as flies, weevils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc. Poor waste management and hygiene practices also have the potential to attract vertebrate pests including rodents, mammalian Carnivores and birds. Proliferation of alien pest species could adversely affect indigenous fauna through competition, predation and disease transmission, and inappropriate poisoning of pests could affect non-target predatory animals (including various potentially occurring CI bat, bird, reptile, and frog species).	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	High	8	Low reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	High	11	High	3
	With	Negative	Site specific	1	Medium term (5-15 years)	3	Medium-low	2	Moderate reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	3	Medium	2
Disease transmission																
Diseases could be transmitted either directly from chickens and their effluent, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of native fauna in the surrounding area.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	High	8	Moderate reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Medium	7	Medium	2
	With	Negative	Site specific	1	Temporary (<2 years)	1	Low	1	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
Altered burning																
The development could result in an increase / decrease in wild fires. Although fires might be unintentionally ignited with carcass burning, for example, it is more likely that burning will be prohibited for human and infrastructural safety. Lack of fire will eventually cause local vegetation to become woodier. Although this might disadvantage grassland-associated CI fauna such as the hedgehog and Secretarybird, it could benefit savanna- and forest-associated CI fauna such as the EN Northern Forest Rain Frog, VU Samango Monkey and NT Sharpe's Grysbok.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	Medium	6	High	3
	With	Negative	Site specific	1	Short term (2-5 years)	2	Low	1	Moderate reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2



POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT RATING	SCORE	DURATION RATING	SCORE	INTENSITY RATING	SCORE	REVERSIBILITY RATING	IRREPLACEABILITY RATING	PROBABILITY RATING	SCORE	SIGNIFICANCE RATING	SCORE	CONFIDENCE RATING	SCORE
Introduction and proliferation of alien species																
An increase in invasive alien flora is likely to be facilitated by the continued influx of vehicles, people and materials (such as fodder containing invasive alien plant seeds), especially where the site is disturbed, and in the absence of any control measures.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Low reversibility	Moderate irreplaceability	Definite (>90% chance)	1	High	10	High	3
	With	Negative	Site specific	1	Short term (2-5 years)	2	Medium-low	2	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
Loss of CI or medicinal flora																
CI or medicinal plant species could be lost as a result of human harvesting during operation or further expansion of the site in the future.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Low reversibility	High irreplaceability	Low probability (10-25% chance)	0,25	Low	3	Medium	2
	With	Negative	Site specific	1	Short term (2-5 years)	2	Low	1	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2
Sensory disturbance of fauna																
Sensory disturbance of fauna from noise and light pollution could cause certain fauna to avoid the site. Animals that would be most adversely affected include calling and/or secretive nocturnal species. Less sensitive common species are likely to tolerate low levels of noise and light pollution, and some species may even benefit - such as bats and frogs, which may forage on insects attracted to lights.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium-low	2	Low reversibility	Low irreplaceability	Definite (>90% chance)	1	Medium	8	High	3
	With	Negative	Site specific	1	Long term (>15 years)	4	Medium-low	2	High reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	4	Medium	2
DECOMMISSIONING																
Introduction and proliferation of alien species																
If no rehabilitation and monitoring efforts are implemented, alien species will continue to increase and spread.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	High	8	Low reversibility	Low irreplaceability	Definite (>90% chance)	1	High	14	High	3
	With	Negative	Site specific	1	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	4	Medium	2
Deterioration of downstream wetland drivers (increased erosion and run-off)																
Possible demolition and landscaping activities during decommissioning are likely to increase bare ground, dust and the land's susceptibility to erosion. These impacts are, however, likely to have a limited and short term impact on local terrestrial and wetland habitat.	Without	Negative	Local (<2km from site)	2	Short term (2-5 years)	2	Medium	4	Moderate reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	Medium	6	Medium	2
	With	Negative	Site specific	1	Short term (2-5 years)	2	Low	1	High reversibility	Low irreplaceability	Probable (25-50% chance)	0,5	Low	2	Medium	2
Sensory disturbance of fauna																
Sensory disturbance of fauna from noise, dust and light pollution will cause certain remaining fauna to vacate the site, at least temporarily during decommissioning.	Without	Negative	Local (<2km from site)	2	Temporary (<2 years)	1	Medium-low	2	Moderate reversibility	Low irreplaceability	Highly probable (50-90% chance)	0,75	Low	4	High	3
	With	Negative	Site specific	1	Temporary (<2 years)	1	Low	1	High reversibility	Low irreplaceability	Low probability (10-25% chance)	0,25	Low	1	Medium	2

Table 10-2 Mitigation measures

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING		
		MONITORING	FREQUENCY	RESPONSIBILITY
CONSTRUCTION				
Loss of seep, and deterioration of downstream wetland drivers				
In line with the mitigation hierarchy, the avoidance of wetland loss is a priority.	Re-align the proposed layout of infrastructure so that it avoids the wetland and wetland buffer, specifically the water reservoir	*Re-align the proposed layout of infrastructure northwards.	During design	CSIR / Mashau Bodwe Chicken Facility Management
Avoid the deterioration of the wetland drivers downstream by minimising dust and erosion.	As the site is on a slope, the developer will need to implement effective measures to control erosion.	*Limit vehicles, people and materials to the construction site.	During construction	Mashau Bodwe Chicken Facility Management, Construction Crew
		*Commence (and preferably complete) construction during winter, when the risk of erosion should be least.	During construction	
		*Revegetate denude areas with locally indigenous flora a.s.a.p.	During construction	
		*Implement erosion protection measures on site to reduce erosion and sedimentation of the local drainage system. Measures could include terracing, bunding around soil stockpiles, and vegetation of areas not to be developed.	During construction	
		*Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road.	During construction	
Loss of terrestrial vegetation and faunal habitat				
Avoid unnecessary loss of vegetation and faunal habitats.	Restrict all clearing of vegetation and disturbance of habitat from construction activities to the final infrastructure footprint.	*Ensure that all infrastructure does not lie in High sensitive areas. It would be ideal if the Primary Woodland is also not affected	During design	CSIR / Mashau Bodwe Chicken Facility Management
		*Clearly demarcate or fence in the construction site. Relocate CI plant and animal specimens from the construction footprint, with advice from an appropriate specialist.	Pre-construction	CSIR / Mashau Bodwe Chicken Facility Management
	Maintain the viability of the indigenous seed bank in excavated soil so that this can be used for subsequent re-vegetation of any disturbed areas. No landscaping should be performed around the facilities.	*Commence (and preferably complete) construction during winter, when the risk of disturbing growing plants should be least.	During construction	Mashau Bodwe Chicken Facility Management, Construction Crew
		*Briefly and effectively stockpile topsoil preferably 1-1.5m in height. Natural vegetation must be allowed to recover in areas of disturbance. If recovery is slow, then a seed mix for the area (using indigenous grass species listed within this report) should be sourced and planted.	During construction	Mashau Bodwe Chicken Facility Management, Construction Crew, with advice from a Botanist /Horticulturist
		Avoid unnecessary loss of indigenous trees specifically Marulas and Ficus species as well as faunal habitat such as termitaria.	*Identify and mark indigenous trees on the ground. Those that are small and cannot be avoided should be transplanted elsewhere on site.	Design / pre-construction
Loss of CI or medicinal flora				
Minimize loss of CI or medicinally important flora, and promote rehabilitation.	Adhere to law and best practice guidelines regarding the displacement of CI and medicinally important floral species.	*Avoid large trees on such such as the Marulas and Ficus species. Obtain permits to remove CI species.	Pre-construction	CSIR / Mashau Bodwe Chicken Facility Management
		*Transplant CI and medicinally important floral specimens from the infrastructure footprint to suitable locations in the surrounding area.	Pre-construction	Botanist / horticulturist
		*Obtain guidance from a suitably qualified vegetation specialist or horticulturist regarding the collection, propagation/storage and transplantation of plants.	During construction	Botanist / horticulturist
Loss of CI fauna				
Minimize mortality and displacement of fauna, especially CI species.	Adhere to law and best practice guidelines regarding the displacement of CI faunal species.	*Appoint an appropriate specialist to relocate CI fauna from vegetation, termitaria and soil that is removed from the infrastructure footprint.	Pre-construction	Zoologist/Ecologist
	Prohibit collection or persecution of fauna.	*Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least.	Pre-construction	Mashau Bodwe Chicken Facility Management, Construction Crew
		*Check open trenches for trapped animals (e.g. hedgehogs, reptiles and frogs), and relocate trapped animals with advice from an appropriate specialist.	Daily during construction	Mashau Bodwe Chicken Facility Management, Construction Crew, Zoologist
		*Prohibit disturbance and persecution (e.g. poaching) of fauna, and introduction of pets and other alien fauna (apart from the production chickens).	All phases	Mashau Bodwe Chicken Facility Management
		*Provide notices and training to inform workers about dangerous animals (e.g. venomous snakes and scorpions) and prohibited activities (e.g. poaching).	All phases	Mashau Bodwe Chicken Facility Management/ External Ecologist (Advisory Capacity)
		*Walk fence lines to remove snares.	As regularly as possibly during all phases	Mashau Bodwe Chicken Facility Management / Farm Management
Introduction and proliferation of alien species				



OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING		
		MONITORING	FREQUENCY	RESPONSIBILITY
Minimize the introduction and spread of invasive alien species during construction.	Regulate / limit access by potential vectors of alien plants.	*Carefully regulate / limit access by vehicles and materials to the construction site. Demarcate or fence in the construction area.	Prior to and during construction	Mashau Bodwe Chicken Facility Management / Farm Management
		*Prohibit the introduction of domestic animals such as dogs and cats.		
		*Remove any woody alien species that germinate.	Pre Construction and continued through the life of the project	Mashau Bodwe Chicken Facility Management / Farm Management
		*Plant only locally indigenous flora if landscaping needs to be done.	All Phases	Lagae La Thlago Management / horticulturist
	Maintain a tidy construction site.	*Keep construction activities neat and tidy. When complete, remove all sand piles and landscape all uneven ground while re-establishing a good topsoil layer.	During construction	Mashau Bodwe Chicken Facility Management, Construction Crew
By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit.	*Remove Category species using mechanical methods, and minimize soil disturbance as far as possible.	During construction	Mashau Bodwe Chicken Facility Management, Construction Crew	
Sensory disturbance of fauna				
Minimize sensory disturbance of fauna.	Time construction activities to minimize sensory disturbance of fauna.	*Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least.	During pre-construction and construction planning	Mashau Bodwe Chicken Facility Management, Construction Crew
	Minimize noise pollution.	*Minimize noise to limit its impact on calling and other sensitive fauna (e.g. frogs and Secretarybird).	Prior to and throughout construction	Mashau Bodwe Chicken Facility Management, Construction Crew
	Minimize light pollution.	*Limit construction activities to day time hours.	Throughout construction	Mashau Bodwe Chicken Facility Management, Construction Crew
		*Minimize or eliminate security and construction lighting, to reduce the disturbance of nocturnal fauna.	Throughout construction	Construction Crew
OPERATION				
Environmental contamination				
No deterioration of water quality and impacts on downstream aquatic ecology.	Ensure that excrement/effluent, carcasses, feed, and other operational waste and hazardous materials are appropriately and effectively contained and disposed of without detriment to the environment.	*Re-align the proposed layout of infrastructure northwards (to avoid the wetland and wetland buffer).	During design	CSIR / Mashau Bodwe Chicken Facility Management
		*Ensure that the facility is designed in accordance with international best practice norms, and with advice from an appropriate specialist, to ensure that there is no environmental contamination from effluent, fodder, carcasses and other waste, and to ensure that there is also effective storm water management.	During design	CSIR / Mashau Bodwe Chicken Facility Management/ Agricultural experts
		*Adhere to best practice chicken husbandry and waste disposal norms.	Throughout operation	CSIR / Mashau Bodwe Chicken Facility Management/ Agricultural experts
	Ensure that there are appropriate control measures in place for any contamination event	*Establish appropriate emergency procedures for accidental contamination of the surroundings. Waste recycling should be incorporated into the facility's operations as far as possible. Designate a secured, access restricted, signposted room for the storage of potentially hazardous substances such as herbicides, pesticides dips and medications. All hazardous waste should be disposed of at an appropriate licensed facility for this.	Prior to operation	Mashau Bodwe Chicken Facility Management and Farm Manager.
		*Rehabilitate contaminated areas a.s.a.p. in accordance with advice from appropriate contamination and environmental specialists.	A.s.a.p. following contamination	Mashau Bodwe Chicken Facility Management and Farm Manager / External contamination specialists
		*Educate workers regarding the handling of hazardous substances and about waste management and emergency procedures with regular training and notices and talks.	At least annually during operation	Mashau Bodwe Chicken Facility Management and Farm Manager.
Poor / Inappropriate control of animal pests				
Minimal pest control, which does not affect non-target animals.	Prevent, detect and control pest infestations before they become a problem, through frequent and careful cleaning, monitoring and control.	*Ensure that there is effective storm water drainage around the facility.	During design, construction and operation	Mashau Bodwe Chicken Facility Management and Farm Manager and on-site team.
		*Ensure that the facility is sufficiently ventilated to keep floors, bedding, and fodder as dry as possible.		
		*Prevent and manage unwanted animal access to fodder.		
		*Check that fan louvers (if installed) work properly, and close fans completely when off.		
		*Ensure that floors are sloped and slatted to facilitate drainage.		



OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING		
		MONITORING	FREQUENCY	RESPONSIBILITY
		*Screed concrete floors properly to seal all cracks and limit the pooling of effluent and water. *Effectively maintain and seal all pipes and reservoirs containing slurry, to prevent animals from accessing the effluent. *Clean floors regularly. *Clean up excess fodder regularly from under troughs and feed bins. * Keep areas surrounding the facility 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 weeds and grass mowed to 5cm or less immediately around the facilities, to reduce the prevalence of insects. *Electrocution devices are available to kill flies, while other mechanical devices include traps, sticky tapes or baited traps. *Control rodents through effective sanitation, rodent proofing and (as humane as possible) extermination. *Rodenticides are not advised. *Ensure that measures to control pests are tightly restricted to areas where these are problematic. Pest control measures should be taxon-specific. If necessary, advice should be sought from an appropriate specialist.		
Disease transmission				
No transmission of diseases to wildlife.	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.	*Maintain appropriate pest control measures.	Life of operation particularly at the onset of the rainy season	Farm Manager and Team
		*Effectively maintain and seal all pipes and reservoirs containing slurry, to prevent animals from accessing the effluent.	Throughout operation	Farm Manager and Team
Altered burning				
No fire on site, without prohibiting wild fires in the surrounding natural environment.	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 prohibited.	*Create safe storage on the premises for flammable materials. If artificial burning is considered necessary, establish and implement a fire management plan with emergency fire procedures.	Prior to, and through operation	CSIR /Mashau Bodwe Chicken Facility Management and Farm Manager
		*Maintain an effective fire break between the facility and the surrounding natural environment.	Prior to, and at least annually during operation	CSIR /Mashau Bodwe Chicken Facility Management and Farm Manager
		*Educate workers about the fire plan and emergency procedures with regular training and notices.	At least annually during operation	CSIR /Mashau Bodwe Chicken Facility Management and Farm Manager
Introduction and proliferation of alien species				
Minimize the introduction and spread of invasive alien species during operation.	Regulate / limit access by potential vectors of alien plants.	*Carefully regulate / limit access by vehicles and materials to the site.	Throughout operation	Mashau Bodwe Chicken Facility Management and Farm Manager
		*Prohibit the introduction of domestic animals such as dogs and cats.		Farm Management/Agricultural experts
	Maintain a neat and tidy production facility.	* Plant only locally indigenous flora if landscaping needs to be done. * Employ best practices regarding tilling of soil and weed management.		
	By law, remove and dispose of alien species on site, wherever they emerge. Specifically Category 1b and 2 species	* Minimize the accumulation or dispersal of excess fodder on site. *Remove Category species using mechanical methods, and minimize soil disturbance as far as possible. Alien debris could be donated to a local community.		Farm Management CSIR /Mashau Bodwe Chicken Facility Management and Farm Manager, with advice from a floral specialist
Loss of CI or medicinal flora				
No harvesting of CI flora.	Harvesting of indigenous flora for medicine, fire wood, building materials, and other purposes must be prohibited.	*Educate the personnel prior to operation, and with yearly refresher talks.	Prior to and during operation	Farm Manager and Team
Sensory disturbance of fauna				



OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING		
		MONITORING	FREQUENCY	RESPONSIBILITY
Minimize sensory disturbance of fauna.	Limit the effects of light pollution on nocturnal fauna (including numerous insects, bats and hedgehogs).	Minimize essential lighting. *Ensure that all outdoor lights are angled downwards and/or fitted with hoods. *Avoid using metal halide, mercury or other bulbs that emit high UV (blue-white) light that is highly and usually fatally attractive to insects. *Use bulbs that emit warm, long wavelength (yellow-red) light, or use UV filters or glass housings on lamps to filter out UV.	During design, construction and operation	Mashau Bodwe Chicken Facility Management and Farm Manager
	Limit the effects of noise from operational activities on fauna such as carnivores, frogs and Secretarybirds.	Minimize unavoidable noise. *Conduct regular maintenance of machinery and ventilation systems / fans (if any).	Prior to and during operation	Mashau Bodwe Chicken Facility Management and Farm Manager/ External Noise Specialists
DECOMMISSIONING				
Introduction and proliferation of alien species				
Minimize introduction and spread of invasive alien species during decommissioning.	Although the site currently does not contain a vast density of alien species, remove and dispose of Category alien species as they emerge on site during operation and decommissioning	*Remove alien species using mechanical methods, and minimize soil disturbance as far as possible.	Throughout decommissioning (at least biannually for three years after closure of the facility)	Mashau Bodwe Chicken Facility Management / Farm Management
Increased dust and erosion				
Minimize dust and erosion.	Implement effective measures to control dust and erosion.	*Limit vehicles to the construction site. *Commence (and preferably complete) decommissioning during winter, when the risk of erosion should be least. *Revegetate denude areas with locally indigenous flora a.s.a.p. *Implement erosion protection measures on site to reduce erosion and sedimentation of the local drainage system. Measures could include bunding around soil stockpiles, and vegetation of areas not to be developed. *Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road.	During decommissioning	Mashau Bodwe Chicken Facility Management, Construction Crew
Sensory disturbance of fauna				
Minimize sensory disturbance of fauna.	Time demolition / rehabilitation activities to minimize sensory disturbance of fauna.	*Commence (and preferably complete) demolition / rehabilitation during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least.	Throughout decommissioning	Project and Construction managers
	Limit disturbance from noise.	* Minimize noise to limit its impact on sensitive fauna.		Mashau Bodwe Chicken Facility Management / Farm Management
	Limit disturbance from light.	*Limit demolition activities to day time hours.		Mashau Bodwe Chicken Facility Management / Farm Management
		*Minimize or eliminate security and other lighting, to reduce the disturbance of nocturnal fauna.		Mashau Bodwe Chicken Facility Management / Farm Management



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12. Appendices

12.1. Mammal list for study area

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (IUCN)	RSA RED LIST STATUS (Friedmann & Daly 2004)	No. OF QDS RECORDS (MammalMAP 2016)	LoO ON SITE
BATHYERGIDAE	Mole-rats					
<i>Cryptomys hottentotus</i>	Southern African Mole-rat		LC (S)	LC		2
BOVIDAE	Even-toed antelope					
<i>Raphicerus campestris</i>	Steenbok		LC (S)	LC		2
<i>Raphicerus sharpei</i>	Sharpe's Grysbok	PS	LC (S)	NT		3
<i>Sylvicapra grimmia</i>	Bush Duiker		LC (S)	LC	1	2
<i>Tragelaphus angasii</i>	Nyala		LC (S)	LC		3
<i>Tragelaphus scriptus</i>	Bushbuck		LC (S)	LC	1	3
<i>Tragelaphus strepsiceros</i>	Greater Kudu		LC (S)	LC		3
CANIDAE	Dogs, foxes, jackals & relatives					
<i>Canis mesomelas</i>	Black-backed Jackal		LC (S)	LC		2
CERCOPITHECIDAE	Baboon & monkeys					
<i>Cercopithecus albogularis erythrarchus</i>	Samango Monkey (subsp. erythrarchus)		LC (D)*	VU	1	3
<i>Cercopithecus pygerythrus pygerythrus</i>	Vervet Monkey		LC (S)	LC	2	2
<i>Papio ursinus</i>	Chacma Baboon		LC (S)	LC		3
EMBALLONURIDAE	Tomb bats					
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat		LC (U)	LC		2
ERINACEIDAE	Hedgehog					
<i>Atelerix frontalis (frontalis)</i>	Southern African Hedgehog		LC (S)	NT		3
FELIDAE	Cats					
<i>Caracal caracal</i>	Caracal		LC (U)	LC		3
<i>Felis silvestris</i>	Wildcat		LC (D)	LC		3
<i>Leptailurus serval</i>	Serval	PS	LC (S)	NT		3
GALAGIDAE	Bushbabies					
<i>Galago moholi</i>	Moholi Bushbaby		LC (S)	LC		2
<i>Otolemur crassicaudatus</i>	Brown Greater Galago		LC (S)	LC	1	3
GLIRIDAE	Dormice					

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (IUCN)	RSA RED LIST STATUS (Friedmann & Daly 2004)	No. OF QDS RECORDS (MammalMAP 2016)	LoO ON SITE
<i>Graphiurus murinus</i>	Forest African Dormouse		LC (S)	LC		2
HERPESTIDAE	Meerkat & mongooses					
<i>Helogale parvula</i>	Common Dwarf Mongoose		LC (S)	LC		2
<i>Herpestes sanguineus</i>	Slender Mongoose		LC (S)	LC		2
<i>Ichneumia albicauda</i>	White-tailed Mongoose		LC (S)	LC		3
<i>Mungos mungo</i>	Banded Mongoose		LC (S)	LC		2
HIPPOSIDERIDAE	Leaf-nosed & related bats					
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat		LC (D)	DD	4	3
HYAENIDAE	Aardwolf & hyenas					
<i>Proteles cristata</i>	Aardwolf		LC (S)	LC		3
HYSTRICIDAE	Porcupine					
<i>Hystrix africaeaustralis</i>	Cape Porcupine		LC (S)	LC		2
LEPORIDAE	Hares & rabbits					
<i>Lepus saxatilis</i>	Scrub Hare		LC (D)	LC		2
MACROSCOLIDIDAE	Elephant shrews					
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant Shrew		LC (U)	DD		2
<i>Elephantulus intufi</i>	Bushveld Elephant Shrew		LC (S)	DD		3
MANIDAE	Pangolin					
MOLOSSIDAE	Free-tailed & related bats					
<i>Chaerephon pumilus</i>	Little Free-tailed Bat		LC (U)	LC	4	2
<i>Mops condylurus</i>	Angolan Free-tailed Bat		LC (U)	LC	4	3
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat		LC (U)	LC	2	2
MURIDAE	Gerbils, rock mice, vlei rats & relatives					
<i>Acomys spinosissimus</i>	Southern African Spiny Mouse		LC (S)	LC	1	3
<i>Aethomys ineptus</i>	Tete Veld Aethomys		LC (U)	LC	1	2
<i>Aethomys namaquensis</i>	Namaqua Rock Mouse		LC (S)	LC		3
<i>Dasymys capensis / incomatus</i>	Water Rat		LC (U)	NT		3
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil		LC (S)	DD		2
<i>Lemniscomys rosalia</i>	Single-Striped Lemniscomys		LC (S)	DD		2
<i>Mastomys coucha</i>	Southern African Mastomys		LC (S)	LC		3
<i>Mastomys natalensis</i>	Natal Mastomys		LC (S)	LC	1	2
<i>Mus minutoides</i>	Southern African Pygmy Mouse		LC (S)	LC		2
<i>Otomys angoniensis</i>	Angoni Vlei Rat		LC (S)	LC		3
<i>Otomys auratus / irroratus</i>	Southern African Vlei Rat		LC (S)	LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (IUCN)	RSA RED LIST STATUS (Friedmann & Daly 2004)	No. OF QDS RECORDS (MammalMAP 2016)	LoO ON SITE
<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat		LC (S)	LC		2
<i>Thallomys paedulcus</i>	Acacia Thallomys		LC (U)	LC		2
MUSTELIDAE	Badger, otters, polecat & weasel					
<i>Ictonyx striatus</i>	Striped Polecat		LC (S)	LC		2
<i>Poecilogale albinucha</i>	African Striped Weasel		LC (U)	DD		3
NESOMYIDAE	Climbing & fat mice & relatives					
<i>Cricetomys ansorgei / gambianus</i>	Southern / Northern Giant Pouched Rat		LC (S)	VU		3
<i>Dendromus melanotis</i>	Gray African Climbing Mouse		LC (S)	LC		3
<i>Dendromus mesomelas</i>	Brants's African Climbing Mouse		LC (S)	LC		2
<i>Saccostomus campestris</i>	Southern African Pouched Mouse		LC (S)	LC		2
<i>Steatomys pratensis</i>	Common African Fat Mouse		LC (S)	LC		3
NYCTERIDAE	Slit-faced bats					
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat		LC (U)	LC	4	2
ORYCTEROPODIDAE	Aardvark					
PEDETIDAE	Spring Hare					
<i>Pedetes capensis</i>	South African Spring Hare		LC (U)	LC		2
PROCAVIIDAE	Hyraxes					
PTEROPODIDAE	Fruit bats					
<i>Epomophorus (gambianus) crypturus</i>	Gambian Epauletted Fruit Bat		LC (U)	DD		2
<i>Epomophorus wahlbergi</i>	Epomophorus wahlbergi		LC (S)	LC		3
<i>Rousettus aegyptiacus</i>	Egyptian Rousette		LC (S)	LC		2
RHINOLOPHIDAE	Horseshoe bats					
<i>Rhinolophus simulator</i>	Bushveld Horseshoe Bat		LC (D)	LC		2
SCIURIDAE	Squirrels					
<i>Paraxerus cepapi</i>	Smith's Bush Squirrel		LC (S)	LC		2
SORICIDAE	Shrews					
<i>Crocidura cyanea</i>	Reddish-gray Musk Shrew		LC (S)	DD	5	2
<i>Crocidura hirta</i>	Lesser Red Musk Shrew		LC (U)	DD	1	2
<i>Crocidura maquassiensis</i>	Makwassie Musk Shrew		LC (U)	VU	1	3
<i>Crocidura mariquensis</i>	Swamp Musk Shrew		LC (U)	DD		3
<i>Myosorex cafer</i>	Dark-footed Mouse Shrew		LC (U)	DD	1	2
<i>Suncus infinitesimus</i>	Least Dwarf Shrew		LC (U)	DD	1	2
<i>Suncus lixus</i>	Greater Dwarf Shrew		LC (U)	DD		2
SUIDAE	Hogs & pigs					

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (IUCN)	RSA RED LIST STATUS (Friedmann & Daly 2004)	No. OF QDS RECORDS (MammalMAP 2016)	LoO ON SITE
<i>Phacochoerus africanus</i>	Common Wart-hog		LC (S)	LC		3
<i>Potamochoerus larvatus (koiropotamus)</i>	Bush-pig		LC (S)	LC	1	3
THRYONOMYIDAE	Cane Rat					
<i>Thryonomys swinderianus</i>	Greater Cane Rat		LC (U)	LC		3
VESPERTILIONIDAE	House, pipistrelle, serotine & related bats					
<i>Laephotis botswanae</i>	Botswanan Long-eared Bat		LC (U)	VU	2	3
<i>Miniopterus natalensis / shreibersii</i>	Natal / Shreiber's Long-fingered Bat		LC (U)	NT		3
<i>Neoromicia capensis</i>	Cape Serotine		LC (S)	LC		2
<i>Neoromicia nanus</i>	Banana Pipistrelle		LC (U)	LC	4	2
<i>Neoromicia zuluensis</i>	Zulu Serotine		LC (U)	LC		2
<i>Pipistrellus rusticus</i>	Rusty Pipistrelle		LC (U)	NT	2	2
<i>Scotophilus dinganii</i>	Yellow-bellied House Bat		LC (U)	LC		2
VIVERRIDAE	Civet & genets					
<i>Civettictis civetta</i>	African Civet		LC (U)	LC		3
<i>Genetta genetta</i>	Common Genet		LC (S)	LC		2
<i>Genetta maculata</i>	Common Large- / Rusty-spotted Genet		LC(U)			2

Status: D = Declining; DD = Data Deficient; LC = Least Concern; NT = Near Threatened; PS = Protected Species; S = Stable; VU = Vulnerable; U = Unknown

Likelihood of Occurrence (LoO): 1 = Present; 2 = High; 3 = Moderate

Sources: Friedmann & Daly (2004); Stuart & Stuart (2007); Monadjem et al. (2010); MammalMAP (2016)

12.2. Bird list for study area

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Apalis, Bar-throated	<i>Apalis thoracica</i>		LC	LC	Yes	1	1
Apalis, Yellow-breasted	<i>Apalis flavida</i>		LC	LC	Yes	1	2
Babbler, Arrow-marked	<i>Turdoides jardineii</i>		LC	LC	Yes		2
Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>		LC	LC	Yes		2
Barbet, Black-collared	<i>Lybius torquatus</i>		LC	LC	Yes	1	1
Barbet, Crested	<i>Trachyphonus vaillantii</i>		LC	LC	Yes	1	1

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Batis, Cape	<i>Batis capensis</i>		LC	LC	Yes		3
Batis, Chinspot	<i>Batis molitor</i>		LC	LC	Yes		2
Bee-eater, European	<i>Merops apiaster</i>		LC	LC	Yes		2
Bee-eater, Little	<i>Merops pusillus</i>		LC	LC	Yes		2
Bee-eater, Southern Carmine	<i>Merops nubicoides</i>		LC	LC	Yes		3
Bee-eater, Swallow-tailed	<i>Merops hirundineus</i>		LC	LC	Yes		3
Bee-eater, White-fronted	<i>Merops bullockoides</i>		LC	LC	Yes	1	2
Bishop, Southern Red	<i>Euplectes orix</i>		LC	LC	Yes	1	2
Bishop, Yellow	<i>Euplectes capensis</i>		LC	LC	Yes	1	3
Boubou, Southern	<i>Laniarius ferrugineus</i>		LC	LC	Yes	1	1
Brownbul, Terrestrial	<i>Phyllastrephus terrestris</i>		LC	LC	Yes		2
Brubru	<i>Nilaus afer</i>		LC	LC	Yes		2
Bulbul, African Red-eyed	<i>Pycnonotus nigricans</i>		LC	LC	Yes		2
Bulbul, Dark-capped	<i>Pycnonotus tricolor</i>		LC	LC	Yes	1	1
Bunting, Golden-breasted	<i>Emberiza flaviventris</i>		LC	LC	Yes		2
Bush-shrike, Gorgeous	<i>Chlorophoneus viridis</i>		LC	LC	Yes		3
Bush-shrike, Grey-headed	<i>Malaconotus blanchoti</i>		LC	LC	Yes		2
Bush-shrike, Orange-breasted	<i>Chlorophoneus sulfureopectus</i>		LC	LC	Yes		2
Bustard, Black-bellied	<i>Lissotis melanogaster</i>		LC	LC	Yes		2
Buttonquail, Common (Kurrichane)	<i>Turnix sylvaticus</i>		LC	LC	Yes		2
Buzzard, Common (Steppe)	<i>Buteo buteo</i>		LC	LC	Yes		2
Buzzard, Jackal	<i>Buteo rufofuscus</i>		LC	LC	Yes		3
Buzzard, Lizard	<i>Kaupifalco monogrammicus</i>		LC	LC	Yes		2
Camaroptera, Green-backed	<i>Camaroptera brachyura</i>		LC	LC	Yes	1	2
Camaroptera, Grey-backed	<i>Camaroptera brevicaudata</i>		LC	LC	Yes		2
Canary, Black-throated	<i>Crithagra atrogularis</i>		LC	LC	Yes		2
Canary, Brimstone	<i>Crithagra sulphurata</i>		LC	LC	Yes		2
Canary, Cape	<i>Serinus canicollis</i>		LC	LC	Yes		2
Canary, Yellow-fronted	<i>Crithagra mozambica</i>		LC	LC	Yes	1	2
Chat, Familiar	<i>Cercomela familiaris</i>		LC	LC	Yes		2
Cisticola, Cloud	<i>Cisticola textrix</i>		LC	LC	Yes		2
Cisticola, Desert	<i>Cisticola aridulus</i>		LC	LC		1	2

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Cisticola, Rattling	<i>Cisticola chiniana</i>		LC	LC	Yes	1	2
Cisticola, Red-faced	<i>Cisticola erythroptus</i>		LC	LC	Yes	1	3
Cisticola, Wailing	<i>Cisticola lais</i>		LC	LC	Yes		2
Cisticola, Zitting	<i>Cisticola juncidis</i>		LC	LC	Yes	1	2
Coucal, Burchell's	<i>Centropus burchellii</i>		LC	LC	Yes	1	2
Cursorer, Bronze-winged	<i>Rhinoptilus chalcopterus</i>		LC	LC	Yes		2
Cursorer, Temminck's	<i>Cursorius temminckii</i>		LC	LC	Yes		2
Crombec, Long-billed	<i>Sylvietta rufescens</i>		LC	LC	Yes	1	2
Crow, Pied	<i>Corvus albus</i>		LC	LC	Yes	1	1
Cuckoo, African	<i>Cuculus gularis</i>		LC	LC	Yes		2
Cuckoo, Black	<i>Cuculus clamosus</i>		LC	LC	Yes		2
Cuckoo, Diederik	<i>Chrysococcyx caprius</i>		LC	LC	Yes	1	2
Cuckoo, Jacobin	<i>Clamator jacobinus</i>		LC	LC	Yes		2
Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>		LC	LC	Yes	1	2
Cuckoo, Levaiant's	<i>Clamator levaillantii</i>		LC	LC	Yes		2
Cuckoo, Red-chested	<i>Cuculus solitarius</i>		LC	LC	Yes	1	2
Cuckooshrike, Grey	<i>Coracina caesia</i>		LC	LC	Yes		2
Dove, African Mourning	<i>Streptopelia decipiens</i>		LC	LC	Yes		2
Dove, Cape Turtle	<i>Streptopelia capicola</i>		LC	LC	Yes	1	2
Dove, Emerald-spotted Wood	<i>Turtur chalcospilos</i>		LC	LC	Yes	1	2
Dove, Laughing	<i>Streptopelia senegalensis</i>		LC	LC	Yes	1	2
Dove, Namaqua	<i>Oena capensis</i>		LC	LC	Yes		2
Dove, Red-eyed	<i>Streptopelia semitorquata</i>		LC	LC	Yes	1	2
Dove, Rock	<i>Columba livia</i>		LC	LC	Yes	1	3
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>		LC	LC	Yes		2
Eagle, African Hawk	<i>Aquila spilogaster</i>		LC	LC	Yes		3
Eagle, Black-chested Snake	<i>Circaetus pectoralis</i>		LC	LC	Yes		3
Eagle, Brown Snake	<i>Circaetus cinereus</i>		LC	LC	Yes		3
Eagle, Martial	<i>Polemaetus bellicosus</i>	EN	VU	EN	Yes		3
Eagle, Steppe	<i>Aquila nipalensis</i>		EN	LC	Yes		3
Eagle, Wahlberg's	<i>Hieraaetus wahlbergi</i>		LC	LC	Yes		3
Egret, Western Cattle	<i>Bubulcus ibis</i>		LC	LC	Yes	1	2

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Falcon, Amur	<i>Falco amurensis</i>		LC	LC	Yes		2
Falcon, Lanner	<i>Falco biarmicus</i>		LC	VU	Yes		3
Finch, Cut-throat	<i>Amadina fasciata</i>		LC	LC	Yes		2
Finch, Scaly-feathered	<i>Sporopipes squamifrons</i>		LC	LC	Yes		2
Firefinch, African	<i>Lagonosticta rubricata</i>		LC	LC	Yes		2
Firefinch, Jameson's	<i>Lagonosticta rhodopareia</i>		LC	LC	Yes		2
Firefinch, Red-billed	<i>Lagonosticta senegala</i>		LC	LC	Yes		2
Fiscal, Southern (Common)	<i>Lanius collaris</i>		LC	LC	Yes		2
Flycatcher, African Paradise	<i>Terpsiphone viridis</i>		LC	LC	Yes	1	2
Flycatcher, Fiscal	<i>Sigelus silens</i>		LC	LC	Yes		2
Flycatcher, Marico	<i>Bradornis mariquensis</i>		LC	LC	Yes		2
Flycatcher, Southern Black	<i>Melaenornis pammelaina</i>		LC	LC	Yes		3
Flycatcher, Spotted	<i>Muscicapa striata</i>		LC	LC	Yes	1	2
Francolin, Coqui	<i>Peliperdix coqui</i>		LC	LC	Yes		2
Francolin, Crested	<i>Dendroperdix sephaena</i>		LC	LC	Yes		2
Francolin, Shelley's	<i>Scleroptila shelleyi</i>		LC	LC	Yes		3
Go-away-bird, Grey	<i>Corythaixoides concolor</i>		LC	LC	Yes		2
Goose, Egyptian	<i>Alopochen aegyptiaca</i>		LC	LC	Yes	1	3
Goshawk, African	<i>Accipiter tachiro</i>		LC	LC	Yes		3
Goshawk, Dark Chanting	<i>Melierax metabates</i>		LC	LC	Yes		2
Goshawk, Gabar	<i>Melierax gabar</i>		LC	LC	Yes		2
Grassbird, Cape	<i>Sphenoeacus afer</i>		LC	LC	Yes		3
Greenbul, Sombre	<i>Andropadus importunus</i>		LC	LC	Yes	1	1
Greenbul, Yellow-bellied	<i>Chlorocichla flaviventris</i>		LC	LC	Yes		1
Guineafowl, Crested	<i>Guttera pucherani</i>		LC	LC	Yes		3
Guineafowl, Helmeted	<i>Numida meleagris</i>		LC	LC	Yes		2
Harrier, African Marsh	<i>Circus ranivorus</i>		LC	EN	Yes		3
Harrier, Pallid	<i>Circus macrourus</i>		NT	NT	Yes		3
Helmet-shrike, White-crested	<i>Prionops plumatus</i>		LC	LC	Yes		2
Heron, Black-headed	<i>Ardea melanocephala</i>		LC	LC	Yes		2
Heron, Grey	<i>Ardea cinerea</i>		LC	LC	Yes		2
Hobby, Eurasian	<i>Falco subbuteo</i>		LC	LC	Yes		3

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Honeyguide, Greater	<i>Indicator indicator</i>		LC	LC	Yes		2
Honeyguide, Lesser	<i>Indicator minor</i>		LC	LC	Yes		2
Honeyguide, Scaly-throated	<i>Indicator variegatus</i>		LC	LC	Yes		2
Hoopoe, African	<i>Upupa africana</i>		LC	LC	Yes		2
Hornbill, African Grey	<i>Tockus nasutus</i>		LC	LC	Yes		2
Hornbill, Southern Yellow-billed	<i>Tockus leucomelas</i>		LC	LC	Yes		2
Ibis, African Sacred	<i>Threskiornis aethiopicus</i>		LC	LC	Yes		3
Ibis, Hadeda	<i>Bostrychia hagedash</i>		LC	LC	Yes		2
Indigobird, Dusky	<i>Vidua funerea</i>		LC	LC	Yes		2
Indigobird, Purple	<i>Vidua purpurascens</i>		LC	LC	Yes		2
Indigobird, Village	<i>Vidua chalybeata</i>		LC	LC	Yes		2
Kestrel, Lesser	<i>Falco naumanni</i>		LC	LC	Yes		2
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>		LC	LC	Yes		2
Kingfisher, Striped	<i>Halcyon chelicuti</i>		LC	LC	Yes	1	2
Kite, Black	<i>Milvus migrans</i>		LC	LC	Yes		2
Kite, Black-shouldered	<i>Elanus caeruleus</i>		LC	LC	Yes		2
Kite, Yellow-billed	<i>Milvus aegyptius</i>		LC	LC	Yes		2
Korhaan, Red-crested	<i>Lophotis ruficrista</i>		LC	LC	Yes		2
Lapwing, African Wattled	<i>Vanellus senegallus</i>		LC	LC	Yes		2
Lapwing, Blacksmith	<i>Vanellus armatus</i>		LC	LC	Yes		2
Lapwing, Crowned	<i>Vanellus coronatus</i>		LC	LC	Yes		2
Lark, Rufous-naped	<i>Mirafraga africana</i>		LC	LC	Yes	1	1
Lark, Sabota	<i>Calendulauda sabota</i>		LC	LC	Yes		2
Longclaw, Cape	<i>Macronyx capensis</i>		LC	LC	Yes		2
Longclaw, Yellow-throated	<i>Macronyx croceus</i>		LC	LC	Yes		2
Mannikin, Bronze	<i>Lonchura cucullata</i>		LC	LC	Yes		2
Mannikin, Red-backed	<i>Lonchura nigriceps</i>		LC	LC	Yes		2
Martin, Banded	<i>Riparia cincta</i>		LC	LC	Yes		3
Martin, Common House	<i>Delichon urbicum</i>		LC	LC	Yes		3
Mousebird, Red-faced	<i>Urocolius indicus</i>		LC	LC	Yes		1
Mousebird, Speckled	<i>Colius striatus</i>		LC	LC	Yes	1	2
Neddicky	<i>Cisticola fulvicapilla</i>		LC	LC	Yes	1	2

ALPHABETICAL NAME	SCIENTIFIC NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	GLOBAL RED LIST STATUS (Taylor et al. 2015)	REGIONAL RED LIST STATUS (Taylor et al. 2015)	RECORDED IN QDS (SABAP 1)	No. OF PENTAD RECORDS (SABAP 2 2016)	LoO ON SITE
Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>		LC	LC	Yes		2
Nightjar, Rufous-cheeked	<i>Caprimulgus rufigena</i>		LC	LC	Yes		2
Oriole, Black-headed	<i>Oriolus larvatus</i>		LC	LC	Yes		2
Oriole, Eurasian Golden	<i>Oriolus oriolus</i>		LC	LC	Yes		3
Owl, African Scops	<i>Otus senegalensis</i>		LC	LC	Yes		2
Owl, Marsh	<i>Asio capensis</i>		LC	LC	Yes		3
Owl, Spotted Eagle-	<i>Bubo africanus</i>		LC	LC	Yes		2
Owl, Western Barn	<i>Tyto alba</i>		LC	LC	Yes		2
Parrot, Brown-headed	<i>Poicephalus cryptoxanthus</i>		LC	LC	Yes		2
Petronia, Yellow-throated	<i>Gymnoris superciliaris</i>		LC	LC	Yes		3
Pigeon, Speckled	<i>Columba guinea</i>		LC	LC	Yes		3
Pipit, African	<i>Anthus cinnamomeus</i>		LC	LC	Yes		2
Pipit, Buffy	<i>Anthus vaalensis</i>		LC	LC	Yes		3
Prinia, Tawny-flanked	<i>Prinia subflava</i>		LC	LC	Yes	1	1
Puffback, Black-backed	<i>Dryoscopus cubla</i>		LC	LC	Yes	1	2
Pytilia, Green-winged	<i>Pytilia melba</i>		LC	LC	Yes		2
Quail, Common	<i>Coturnix coturnix</i>		LC	LC	Yes		2
Quail, Harlequin	<i>Coturnix delegorguei</i>		LC	LC	Yes		3
Quelea, Red-billed	<i>Quelea quelea</i>		LC	LC	Yes		2
Robin-chat, Cape	<i>Cossypha caffra</i>		LC	LC	Yes		2
Robin-chat, White-browed	<i>Cossypha heuglini</i>		LC	LC	Yes	1	2
Robin-chat, White-throated	<i>Cossypha humeralis</i>		LC	LC	Yes	1	3
Robin, White-browed Scrub	<i>Erythropygia leucophrys</i>		LC	LC	Yes	1	2
Roller, European	<i>Coracias garrulus</i>		LC	NT	Yes		3
Roller, Lilac-breasted	<i>Coracias caudatus</i>		LC	LC	Yes		2
Roller, Purple	<i>Coracias naevius</i>		LC	LC	Yes		3
Scimitarbill, Common	<i>Rhinopomastus cyanomelas</i>		LC	LC	Yes		2
Secretarybird	<i>Sagittarius serpentarius</i>		VU	VU	Yes		3
Seedeater, Streaky-headed	<i>Crithagra gularis</i>		LC	LC	Yes		2
Shikra	<i>Accipiter badius</i>		LC	LC	Yes		3
Shrike, Crimson-breasted	<i>Laniarius atrococcineus</i>		LC	LC	Yes		2
Shrike, Red-backed	<i>Lanius collurio</i>		LC	LC	Yes		2

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Sparrow-weaver, White-browed	<i>Plocepasser mahali</i>		LC	LC	Yes		2
Sparrow, Cape	<i>Passer melanurus</i>		LC	LC	Yes		2
Sparrow, House	<i>Passer domesticus</i>				Yes	1	2
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>		LC	LC	Yes		2
Spurfowl, Natal	<i>Pternistis natalensis</i>		LC	LC	Yes	1	1
Spurfowl, Swainson's	<i>Pternistis swainsonii</i>		LC	LC	Yes		2
Starling, Cape Glossy	<i>Lamprotornis nitens</i>		LC	LC	Yes	1	2
Starling, Greater Blue-eared	<i>Lamprotornis chalybaeus</i>		LC	LC	Yes		3
Starling, Violet-backed	<i>Cinnyricinclus leucogaster</i>		LC	LC	Yes		2
Starling, Wattled	<i>Creatophora cinerea</i>		LC	LC	Yes		2
Stonechat, African	<i>Saxicola torquatus</i>		LC	LC	Yes	1	2
Stork, Abdim's	<i>Ciconia abdimii</i>		LC	NT	Yes		3
Stork, White	<i>Ciconia ciconia</i>		LC	LC	Yes		3
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>		LC	LC	Yes		2
Sunbird, Collared	<i>Anthodiaeta collaris</i>		LC	LC	Yes		2
Sunbird, Greater Double-collared	<i>Cinnyris afer</i>		LC	LC	Yes		2
Sunbird, Marico	<i>Cinnyris mariquensis</i>		LC	LC	Yes		2
Sunbird, Scarlet-chested	<i>Chalcomitra senegalensis</i>		LC	LC	Yes	1	1
Sunbird, White-bellied	<i>Cinnyris talatala</i>		LC	LC	Yes	1	1
Swallow, Barn	<i>Hirundo rustica</i>		LC	LC	Yes	1	2
Swallow, Greater Striped	<i>Cecropis cucullata</i>		LC	LC	Yes		2
Swallow, Lesser Striped	<i>Cecropis abyssinica</i>		LC	LC	Yes	1	2
Swallow, Pearl-breasted	<i>Hirundo dimidiata</i>		LC	LC	Yes		2
Swallow, White-throated	<i>Hirundo albigularis</i>		LC	LC	Yes		3
Swallow, Wire-tailed	<i>Hirundo smithii</i>		LC	LC	Yes		3
Swift, African Black	<i>Apus barbatus</i>		LC	LC	Yes		3
Swift, African Palm	<i>Cypsiurus parvus</i>		LC	LC	Yes		3
Swift, Alpine	<i>Tachymarptis melba</i>		LC	LC	Yes		3
Swift, Horus	<i>Apus horus</i>		LC	LC	Yes		2
Swift, Little	<i>Apus affinis</i>		LC	LC	Yes		2
Swift, White-rumped	<i>Apus caffer</i>		LC	LC	Yes		2
Tchagra, Black-crowned	<i>Tchagra senegalus</i>		LC	LC	Yes	1	2

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Tchagra, Brown-crowned	<i>Tchagra australis</i>		LC	LC	Yes	1	1
Thick-knee, Spotted	<i>Burhinus capensis</i>		LC	LC	Yes		2
Thrush, Kurrichane	<i>Turdus libonyanus</i>		LC	LC	Yes		3
Thrush, Olive	<i>Turdus olivaceus</i>		LC	LC	Yes		3
Tinkerbird, Yellow-fronted	<i>Pogoniulus chrysoconus</i>		LC	LC	Yes	1	2
Tit-Babbler, Chestnut-vented	<i>Sylvia subcaerulea</i>		LC	LC	Yes		2
Tit, Southern Black	<i>Parus niger</i>		LC	LC	Yes		2
Turaco, Purple-crested	<i>Tauraco porphyreolophus</i>		LC	LC	Yes		2
Wagtail, Cape	<i>Motacilla capensis</i>		LC	LC	Yes	1	3
Warbler, Marsh	<i>Acrocephalus palustris</i>		LC	LC		1	3
Warbler, Willow	<i>Phylloscopus trochilus</i>		LC	LC	Yes	1	2
Waxbill, Blue	<i>Uraeginthus angolensis</i>		LC	LC	Yes	1	2
Waxbill, Common	<i>Estrilda astrild</i>		LC	LC	Yes		2
Waxbill, Orange-breasted	<i>Amandava subflava</i>		LC	LC	Yes		2
Waxbill, Violet-eared	<i>Uraeginthus granatinus</i>		LC	LC	Yes		2
Weaver, African (Holub's) Golden	<i>Ploceus xanthops</i>		LC	LC	Yes		3
Weaver, Cape	<i>Ploceus capensis</i>		LC	LC	Yes		2
Weaver, Lesser Masked	<i>Ploceus intermedius</i>		LC	LC	Yes	1	2
Weaver, Southern Masked	<i>Ploceus velatus</i>		LC	LC	Yes		2
Weaver, Spectacled	<i>Ploceus ocularis</i>		LC	LC	Yes	1	3
Weaver, Thick-billed	<i>Amblyospiza albifrons</i>		LC	LC	Yes		2
Weaver, Village	<i>Ploceus cucullatus</i>		LC	LC	Yes	1	2
White-eye, Cape	<i>Zosterops virens</i>		LC	LC	Yes	1	2
White-eye, Orange River	<i>Zosterops pallidus</i>		LC	LC	Yes		2
Whydah, Long-tailed Paradise	<i>Vidua paradisaea</i>		LC	LC	Yes		2
Whydah, Pin-tailed	<i>Vidua macroura</i>		LC	LC	Yes	1	2
Whydah, Shaft-tailed	<i>Vidua regia</i>		LC	LC	Yes		2
Widowbird, Red-collared	<i>Euplectes ardens</i>		LC	LC	Yes	1	2
Widowbird, White-winged	<i>Euplectes albonotatus</i>		LC	LC	Yes	1	2
Wood-hoopoe, Green	<i>Phoeniculus purpureus</i>		LC	LC	Yes		2
Woodpecker, Cardinal	<i>Dendropicus fuscescens</i>		LC	LC	Yes		2
Woodpecker, Golden-tailed	<i>Campethera abingoni</i>		LC	LC	Yes		3

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Wryneck, Red-throated	<i>Jynx ruficollis</i>		LC	LC	Yes		2

Status: CR = Critically Endangered; DD = Data Deficient; EN = Endangered; LC = Least Concern; NA = Not Assessed; NR = Not Recognized by BirdLife International; NT = Not Taxonomically Treated

Likelihood of Occurrence (LoO): 1 = Present; 2 = High; 3 = Moderate

Sources: Taylor *et al.* (2015); BirdLife South Africa (2016); SABAP 2 (2016)

12.3. Reptile list for study area

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	RED LIST STATUS (Bates <i>et al.</i> 2014)	No. of QDS RECORDS (ReptileMAP 2016)	LoO ON SITE
AGAMIDAE	Agamas				
<i>Acanthocercus atricollis atricollis</i>	Southern Tree Agama		1LC	2	2
<i>Agama aculeata distanti</i>	Distant's Ground Agama		1LC		2
AMPHISBAENIDAE	Worm lizards				
<i>Chirindia langi occidentalis</i>	Soutpansberg Worm Lizard		1VU		2
CHAMAELEONIDAE	Chameleons				
<i>Bradypodion transvaalense</i>	Wolkberg Dwarf Chameleon		1LC	9	2
<i>Chamaeleo dilepis dilepis</i>	Common Flap-neck Chameleon		2LC	1	2
COLUBRIDAE	Typical snakes				
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake		2LC		2
<i>Dasypeltis inornata</i>	Southern Brown Egg-eater		1LC		3
<i>Dasypeltis scabra</i>	Rhombic Egg-eater		2LC	1	2
<i>Dispholidus typus typus</i>	Boomslang		2LC		2
<i>Dispholidus typus viridis</i>	Northern Boomslang			1	2
<i>Philothamnus hoplogaster</i>	South Eastern Green Snake		2LC		3
<i>Philothamnus natalensis occidentalis</i>	Western Natal Green Snake		1LC		3
<i>Philothamnus semivariiegatus</i>	Spotted Bush Snake		2LC		2
<i>Telescopus semiannulatus semiannulatus</i>	Eastern Tiger Snake		2LC		2
<i>Thelotornis capensis capensis</i>	Southern Twig Snake		1LC		2
CORDYLIDAE	Crag, flat & girdled lizards				
<i>Chamaesaura anguina anguina</i>	Cape Grass Lizard		1LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RSA LEGAL STATUS (NEM:BA ToPS 2015)	RED LIST STATUS (Bates <i>et al.</i> 2014)	No. of QDS RECORDS (ReptileMAP 2016)	LoO ON SITE
ELAPIDAE	Cobras, mambas & relatives				
<i>Aspidelaps scutatus scutatus</i>	Speckled Shield Cobra		1LC		3
<i>Dendroaspis polylepis</i>	Black Mamba		2LC		2
<i>Elapsoidea sundevallii longicauda</i>	Long-tailed Garter Snake				3
<i>Naja annulifera</i>	Snouted Cobra		2LC	1	2
<i>Naja mossambica</i>	Mozambique Spitting Cobra		2LC		2
GEKKONIDAE	Geckos				
<i>Afroedura pienaari</i>	Pienaar's Flat Gecko				3
<i>Chondrodactylus turneri</i>	Turner's Gecko		1LC		2
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko		2LC	5	2
<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko		1LC		2
<i>Lygodactylus capensis capensis</i>	Common Dwarf Gecko		1LC	3	2
<i>Lygodactylus incognitus</i>	Cryptic Dwarf Gecko		1DD		3
<i>Lygodactylus soutpansbergensis</i>	Soutpansberg Dwarf Gecko		1NT		3
<i>Pachydactylus affinis</i>	Transvaal Gecko		1LC		2
<i>Pachydactylus capensis</i>	Cape Gecko		2LC		3
<i>Pachydactylus punctatus</i>	Speckled Gecko		2LC		3
<i>Pachydactylus tigrinus</i>	Tiger Gecko		1LC		3
<i>Pachydactylus vansoni</i>	Van Son's Gecko		1LC	1	2
GERRHOSAURIDAE	Plated lizards & seps				
<i>Broadleysaurus major</i>	Rough-scaled Plated Lizard		2LC		3
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard		2LC		2
<i>Matobosaurus validus</i>	Common Giant Plated Lizard		1LC		2
LACERTIDAE	Typical lizards				
<i>Heliobolus lugubris</i>	Bushveld Lizard		2LC		3
<i>Meroles squamulosus</i>	Common Rough-scaled Lizard		1LC		2
<i>Nucras holubi</i>	Holub's Sandveld Lizard		2LC	1	2
<i>Nucras intertexta</i>	Spotted Sandveld Lizard		2LC		2
<i>Nucras lalandii</i>	Delalande's Sandveld Lizard		1LC		3
LAMPROPHIIDAE	Lamprophid snakes				
<i>Amblyodipsas microphthalmma nigra</i>	Soutpansberg Purple-glossed snake		1LC		3
<i>Amblyodipsas polylepis polylepis</i>	Common Purple-glossed Snake		1LC		3
<i>Aparallactus capensis</i>	Black-headed Centipede-eater		2LC		2

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<i>Atractaspis bibronii</i>	Bibron's Stiletto Snake		2LC		2
<i>Boaedon capensis</i>	Brown House Snake		2LC	1	2
<i>Duberria lutrix lutrix</i>	South African Slug-eater		1LC	1	2
<i>Gonionotophis capensis capensis</i>	Common File Snake		2LC		2
<i>Hemirhagerrhis nototaenia</i>	Eastern Bark Snake		2LC		3
<i>Lamprophis aurora</i>	Aurora House Snake		1LC		3
<i>Lamprophis fuscus</i>	Yellow-bellied House Snake		1LC		3
<i>Lycodonomorphus inornatus</i>	Olive House Snake		1LC		3
<i>Lycodonomorphus rufulus</i>	Brown Water Snake		1LC		3
<i>Lycophidion capense capense</i>	Cape Wolf Snake		2LC	2	2
<i>Lycophidion variegatum</i>	Variiegated Wolf Snake		2LC		3
<i>Prosymna lineata</i>	Lined Shovel-snout		1LC		3
<i>Prosymna stuhlmannii</i>	East African Shovel-snout		2LC	1	2
<i>Psammophis brevirostris</i>	Short-snouted Grass Snake		1LC		2
<i>Psammophis crucifer</i>	Cross-marked Grass Snake		1LC		3
<i>Psammophis mossambicus</i>	Olive Grass Snake		2LC		3
<i>Psammophis subtaeniatus</i>	Western Yellow-bellied Sand Snake		2LC		2
<i>Psammophis trinasalis</i>	Fork-marked Sand Snake		2LC		3
<i>Psammophylax rhombeatus rhombeatus</i>	Spotted Grass Snake		2LC		2
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake		2LC		2
<i>Pseudaspis cana</i>	Mole Snake		2LC		2
<i>Rhamphiophis rostratus</i>	Rufous Beaked Snake		2LC		3
LEPTOTYPHLOPIDAE	Thread snakes				
<i>Leptotyphlops distanti</i>	Distant's Thread Snake		1LC		3
<i>Leptotyphlops incognitus</i>	Incognito Thread Snake		1LC		2
<i>Leptotyphlops scutifrons scutifrons</i>	Peters' Thread Snake		1LC		2
PELOMEDUSIDAE	Terrapins				
PYTHONIDAE	Python				
<i>Python natalensis</i>	Southern African Python	PS	2LC	2	3
SCINCIDAE	Skinks				
<i>Acontias cregoi</i>	Cregoi's Blind Legless Skink		2LC	2	3
<i>Acontias plumbeus</i>	Giant Legless Skink		1LC	1	3

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<i>Mochlus sundevallii sundevallii</i>	Sundevall's Writhing Skink		2LC		2
<i>Panaspis maculicollis</i>	Spotted-neck Snake-eyed Skink		2LC		3
<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink		2LC	1	2
<i>Trachylepis capensis</i>	Cape Skink		2LC		2
<i>Trachylepis margaritifer</i>	Rainbow Skink		2LC	2	2
<i>Trachylepis punctulata</i>	Speckled Sand Skink		2LC		3
<i>Trachylepis striata</i>	Striped Skink		2LC		2
<i>Trachylepis varia</i>	Variable Skink		2LC	5	2
TESTUDINIDAE	Tortoises				
<i>Kinixys spekii</i>	Speke's Hinged Tortoise		2LC	1	3
<i>Stigmochelys pardalis</i>	Leopard Tortoise		1LC	1	3
TYPHLOPIDAE	Blind snakes				
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake		1LC		2
<i>Afrotyphlops schlegelii</i>	Schlegel's Beaked Blind Snake		LC		3
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake		2LC		3
VIPERIDAE	Adders				
<i>Bitis arietans arietans</i>	Puff Adder		2LC		2
<i>Causus defilippii</i>	Snouted Night Adder		2LC		2
<i>Causus rhombeatus</i>	Rhombic Night Adder		2LC		2
Status: 1 = Global; 2 = Regional; DD = Data Deficient; EN = Endangered; LC = Least Concern; NT = Near Threatened; PS = Protected Species; VU = Vulnerable; * Status assigned to species					
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate					
Sources: Bates <i>et al.</i> (2014); ReptileMAP (2016)					

12.4. Frog list for study area

FAMILY & SCIENTIFIC NAME	COMMON NAME	GLOBAL RED LIST STATUS (IUCN)	RSA, LSO & SWZ RED LIST STATUS (Minter <i>et al.</i> 2004)	No. OF QDS RECORDS (FrogMAP 2016)	LoO ON SITE
BREVICIPITIDAE	Rain frogs				
<i>Breviceps adspersus adspersus</i>	Bushveld Rain Frog	LC (U)*	LC	1	2
<i>Breviceps sylvestris taeniatus</i>	Northern Forest Rain Frog	EN (U)*	VU	1	3
BUFONIDAE	True toads				
<i>Poyntonophrynus fenoulheti</i>	Northern Pygmy Toad	LC (U)	LC		2
<i>Schismaderma carens</i>	Red Toad	LC (U)	LC	1	2
<i>Sclerophrys capensis</i>	Raucous Toad	LC (D)	LC		2
<i>Sclerophrys garmani</i>	Olive Toad	LC (U)	LC	1	2
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC (I)	LC	3	2
<i>Sclerophrys maculata</i>	Flat-backed Toad	LC (S)	LC	1	2
HEMISOTIDAE	Shovel-nosed frogs				
<i>Hemisis marmoratus</i>	Mottled Shovel-nosed Frog	LC (U)	LC	1	3
HYPEROLIIDAE	Leaf-folding & reed frogs				
<i>Kassina senegalensis</i>	Bubbling Kassina	LC (U)	LC	2	3
MICROHYLIDAE	Rubber frogs				
<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	LC (U)	LC	1	3
PHRYNOBATRACHIDAE	Puddle frogs				
<i>Phrynobatrachus mababiensis</i>	Dwarf Puddle Frog	LC (S)	LC		3
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC (S)	LC	1	3
PIPIDAE	African clawed frogs				
PTYCHADENIDAE	Grass frogs				
<i>Hildebrandtia ornata</i>	Ornate Frog	LC (U)	LC		3
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC (U)	LC	1	3
<i>Ptychadena mossambica</i>	Broad-banded Grass Frog	LC (U)	LC		3
PYXICEPHALIDAE	Moss, river, sand & stream frogs				
<i>Cacosternum boettgeri</i>	Common Caco	LC (U)	LC		3
<i>Pyxicephalus edulis</i>	African Bullfrog	LC (U)	LC		3
<i>Tomopterna cryptotis</i>	Tremolo Sand Frog	LC (S)	LC		2
<i>Tomopterna krugerensis</i>	Knocking Sand Frog	LC (U)	LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	GLOBAL RED LIST STATUS (IUCN)	RSA, LSO & SWZ RED LIST STATUS (Minter <i>et al.</i> 2004)	No. OF QDS RECORDS (FrogMAP 2016)	LoO ON SITE
<i>Tomopterna marmorata</i>	Russet-backed Sand Frog	LC (U)	LC		3
<i>Tomopterna natalensis</i>	Natal Sand Frog	LC (U)	LC	1	2

Status: D = Declining; EN = Endangered; I = Increasing; LC = Least Concern; NT = Near Threatened; S = Stable; U = Unknown population trend; VU = Vulnerable; * Status assigned to species

Likelihood of Occurrence (LoO): 1 = Present; 2 = High; 3 = Moderate

Sources: Minter *et al.* (2004); Du Preez & Carruthers (2009); Measey (2011); IUCN (2013.1); ToPS List (2015); FrogMap (2016)

12.5. Butterfly list for study area

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
HESPERIIDAE	Sandmen, skippers, sylphs & relatives			
<i>Abantis paradisea</i>	Paradise Skipper	1LC	1	3
<i>Abantis tettensis</i>	Spotted Velvet Skipper	1LC		3
<i>Acleros mackenii mackenii</i>	Macken's Dart	1LC		3
<i>Borbo borbonica borbonica</i>	Olive-Haired Swift	1LC		3
<i>Borbo fallax</i>	False Swift	1LC		3
<i>Borbo fatuellus fatuellus</i>	Long-Horned Swift	1LC		3
<i>Borbo gemella</i>	Twin Swift	1LC		3
<i>Caprona pillaana</i>	Ragged Skipper	1LC		3
<i>Celaenorrhinus mokeezi separata</i>	Christmas Forester	1LC	4	3
<i>Coeliades forestan forestan</i>	Striped Policeman	1LC		3
<i>Coeliades pistratus</i>	Two-Pip Policeman	1LC		3
<i>Eretis djaelaelae</i>	Marbled Elf	1LC	1	3
<i>Eretis umbra umbra</i>	Small Marbled Elf	1LC		3
<i>Gegenes niso niso</i>	Common Hottentot	1LC	2	2
<i>Gegenes pumilio gambica</i>	Dark Hottentot	1LC		3
<i>Gomalia elma elma</i>	Green-Marbled Skipper	?		3
<i>Kedestes callicles</i>	Pale Ranger	?LC		3
<i>Kedestes macomo</i>	Macomo Ranger	1LC		3
<i>Leucochitonea levubu</i>	White-Cloaked Skipper	1LC		3
<i>Metisella metis paris</i>	Gold-Spotted Sylph	1LC	2	3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Metisella willemi</i>	Netted Sylph	1LC		3
<i>Netrobalane canopus</i>	Buff-Tipped Skipper	1LC	1	3
<i>Parnara monasi</i>	Water Watchman	1LC	1	3
<i>Parosmodes morantii morantii</i>	Morant's Orange	1LC		3
<i>Pelopidas mathias</i>	Black-Banded Swift	1LC		3
<i>Pelopidas thrax</i>	White-Banded Swift	1LC		3
<i>Platylesches ayresii</i>	Peppered Hopper	1LC	1	3
<i>Platylesches galesa</i>	White-Tail Hopper	1LC		3
<i>Platylesches moritili</i>	Honey Hopper	?LC	1	3
<i>Platylesches neba</i>	Flower-Girl Hopper	1LC		3
<i>Sarangesa motozi</i>	Elfin Skipper	1LC	1	3
<i>Sarangesa phidyle</i>	Small Elfin	1LC		3
<i>Sarangesa seineri seineri</i>	Dark Elfin	1LC		3
<i>Spialia asterodia</i>	Star Sandman	1LC		3
<i>Spialia colotes transvaaliae</i>	Bushveld Sandman	1LC		3
<i>Spialia delagoae</i>	Delagoa Sandman	1LC		3
<i>Spialia depauperata australis</i>	Wandering Sandman	1LC		3
<i>Spialia diomus ferax</i>	Common Sandman	1LC		3
<i>Spialia dromus</i>	Forest Sandman	1LC	2	3
<i>Spialia mafa mafa</i>	Mafa Sandman	1LC		3
<i>Spialia spio</i>	Mountain Sandman	1LC		3
<i>Tagiades flesus</i>	Clouded Forester	1LC	1	3
<i>Tsitana tsita</i>	Dismal Sylph	1LC	16	2
<i>Zenonia zeno</i>	Orange-Spotted Hopper	1LC		3
LYCAENIDAE	Blues, coppers, opals & relatives			
<i>Actizera lucida</i>	Rayed Blue	1LC	1	2
<i>Alaena amazoula ochroma</i>	Yellow Zulu	1LC		3
<i>Aloeides aranda</i>	Aranda Copper	1LC		3
<i>Aloeides damarensis mashona</i>	Damara Copper	1LC		3
<i>Aloeides dryas</i>	Transvaal Copper	1LC	1	2
<i>Aloeides swanepoeli</i>	Swanepoel's Copper	1LC	2	3
<i>Aloeides taikosama</i>	Dusky Copper	1LC		3
<i>Anthene amarah amarah</i>	Black Striped Hairtail	1LC	1	2

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Anthene definita definita</i>	Common Hairtail	1LC		3
<i>Anthene livida livida</i>	Pale Hairtail	1LC		3
<i>Anthene otacilia otacilia</i>	Otacilia Hairtail	1LC		3
<i>Aphnaeus hutchinsonii</i>	Hutchinson's Highflier	1LC		3
<i>Axiocerses amanga amanga</i>	Bush Scarlet	1LC		3
<i>Axiocerses tjoane tjoane</i>	Eastern Scarlet	1LC	1	2
<i>Azanus jesous</i>	Topaz Babul Blue	1LC	1	2
<i>Azanus mirza</i>	Pale Babul Blue	1LC	2	3
<i>Azanus moriqua</i>	Black-Bordered Babul Blue	1LC	1	3
<i>Azanus natalensis</i>	Natal Babul Blue	1LC	4	2
<i>Azanus ubaldus</i>	Velvet-Spotted Babul Blue	1LC		3
<i>Cacyreus lingeus</i>	Bush Bronze	1LC	5	2
<i>Cacyreus marshalli</i>	Common Geranium Bronze	1LC		3
<i>Cacyreus virilis</i>	Mocker Bronze	1LC	1	2
<i>Capys disjunctus</i>	Russet Protea	1LC		3
<i>Chilades trochylus</i>	Grass Jewel	1LC		3
<i>Cigaritis ella</i>	Ella's Bar	1LC		3
<i>Cigaritis mozambica</i>	Mozambique Bar	1LC		3
<i>Cigaritis natalensis</i>	Natal Bar	1LC		3
<i>Cigaritis phanes</i>	Silvery Bar	1LC		3
<i>Cnodontes penningtoni</i>	Pennington's Buff	1LC		3
<i>Crudaria leroma</i>	Silver Spotted Grey	1LC		3
<i>Cupidopsis cissus cissus</i>	Common Meadow Blue	1LC		3
<i>Cupidopsis jobates jobates</i>	Tailed Meadow Blue	1LC		3
<i>Eicochrysops hippocrates</i>	White-Tipped Blue	1LC	1	3
<i>Euchrysops dolorosa</i>	Sabie Smoky Blue	1LC		3
<i>Euchrysops malathana</i>	Common Smoky Blue	1LC		3
<i>Euchrysops osiris</i>	Osiris Smoky Blue	1LC	1	3
<i>Euchrysops subpallida</i>	Ashen Smoky Blue	1LC	1	3
<i>Hemiolaus caeculus caeculus</i>	Azure Hairstreak	1LC		3
<i>Hypolycaena philippus philippus</i>	Purplebrown Hairstreak	1LC		3
<i>Iolaus silarus silarus</i>	Straight-Line Sapphire	1LC		3
<i>Iolaus trimeni</i>	Trimen's Sapphire	1LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Lachnocnema bibulus</i>	Common Woolly Legs	1LC		3
<i>Lachnocnema durbani</i>	D'Urban's Woolly Legs	1LC		3
<i>Lachnocnema laches</i>	Southern Pied Woolly Legs	1LC		3
<i>Lampides boeticus</i>	Pea Blue	1LC	2	2
<i>Lepidochrysops glauca</i>	Silvery Blue	1LC	1	2
<i>Lepidochrysops patricia</i>	Patricia Blue	1LC		3
<i>Lepidochrysops plebeia plebeia</i>	Twin-Spot Blue	1LC		3
<i>Lepidochrysops tantalus</i>	King Blue	1LC		3
<i>Lepidochrysops vansoni</i>	Van_Son's Blue	1LC		3
<i>Leptomyrina gorgias gorgias</i>	Common Black-Eye	1LC		3
<i>Leptomyrina hirundo</i>	Tailed Black-Eye	1LC		3
<i>Leptotes brevidentatus</i>	Short-Toothed Zebra Blue	1LC		3
<i>Leptotes jeanneli</i>	Jeannel's Zebra Blue	1LC		3
<i>Leptotes pirithous pirithous</i>	Common Zebra Blue	1LC	1	2
<i>Myrina dermaptera dermaptera</i>	Lesser Fig Tree Blue	1LC		3
<i>Myrina silenus ficedula</i>	Common Fig Tree Blue	1LC		3
<i>Oraidium barberae</i>	Dwarf Blue	1LC		3
<i>Pseudonacaduba sichela sichela</i>	Dusky Line Blue	1LC		3
<i>Stugeta bowkeri tearei</i>	Bowker's Marbled Sapphire	1LC		3
<i>Tarucus sybaris sybaris</i>	Dotted Blue	1LC		3
<i>Tuxentius calice</i>	White Pie	1LC		3
<i>Tuxentius melaena melaena</i>	Black Pie	1LC	4	2
<i>Uranotaenia nubifer nubifer</i>	Black Heart	1LC		3
<i>Virachola antalus</i>	Brown Playboy	1LC	1	2
<i>Virachola dinochares</i>	Apricot Playboy	1LC		3
<i>Virachola diocles</i>	Orange-Barred Playboy	1LC		3
<i>Zintha hintza hintza</i>	Hintza Pierrot	1LC		3
<i>Zizeeria knysna knysna</i>	African Grass Blue	1LC	1	2
<i>Zizina otis antanossa</i>	Dark Grass Blue	1LC		3
<i>Zizula hylax</i>	Tiny Grass Blue	1LC		3
NYMPHALIDAE	Acraeas, browns, charaxes & relatives			
<i>Acraea acara acara</i>	Acara Acraea	1LC	1	3
<i>Acraea aganice aganice</i>	Wanderer	1LC	1	2

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Acraea aglaonice</i>	Clear-Spotted Acraea	1LC		3
<i>Acraea anemosa</i>	Broad-Bordered Acraea	1LC		3
<i>Acraea axina</i>	Little Acraea	1LC	1	3
<i>Acraea caldarena caldarena</i>	Black-Tipped Acraea	1LC	1	3
<i>Acraea horta</i>	Garden Acraea	1LC		3
<i>Acraea natalica</i>	Natal Acraea	1LC	7	2
<i>Acraea neobule neobule</i>	Wandering Donkey Acraea	1LC		3
<i>Acraea nohara nohara</i>	Light Red Acraea	1LC	2	3
<i>Acraea oncaea</i>	Window Acraea	1LC	1	3
<i>Amauris albimaculata albimaculata</i>	Layman; Layman Friar	1LC	3	2
<i>Amauris echeria echeria</i>	Chief, Chief Friar	1LC	4	2
<i>Antanartia schaeeneia schaeeneia</i>	Long-Tailed Admiral	1LC	1	3
<i>Bicyclus angulosus selousi</i>	Startled Bush Brown		1	2
<i>Bicyclus anynana anynana</i>	Squinting Bush Brown	?LC	2	2
<i>Bicyclus ena</i>	Grizzled Bush Brown	1LC		3
<i>Bicyclus safitza safitza</i>	Common Bush Brown	1LC	14	2
<i>Byblia anvatarata achelonia</i>	Joker	1LC		3
<i>Byblia ilithyia</i>	Spotted Joker	1LC	1	2
<i>Cassionympha cassius</i>	Rainforest Brown	1LC	2	3
<i>Catacroptera cloanthe cloanthe</i>	Pirate	1LC		3
<i>Charaxes achaemenes achaemenes</i>	Bushveld Charaxes	1LC	1	2
<i>Charaxes brutus natalensis</i>	White-Barred Charaxes	1LC	6	3
<i>Charaxes candiope</i>	Green-Veined Charaxes	1LC	1	3
<i>Charaxes castor flavifasciatus</i>	Giant Charaxes	1LC		3
<i>Charaxes druceanus entabeni</i>	Silver-Barred Charaxes	1LC	12	3
<i>Charaxes ethalion ethalion</i>	Coast Charaxes	1LC	1	3
<i>Charaxes jahlusa rex</i>	Pearl-Spotted Charaxes	1LC		3
<i>Charaxes jasius saturnus</i>	Foxy Charaxes	1LC		3
<i>Charaxes phaeus</i>	Demon Charaxes	1LC		3
<i>Charaxes vansoni</i>	Van Son's Charaxes	1LC		3
<i>Charaxes varanes varanes</i>	Pearl Charaxes	1LC	3	2
<i>Charaxes xiphares bavenda</i>	Forest-King Charaxes	1LC	17	3
<i>Charaxes zoolina</i>	Club-Tailed Charaxes	1LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Coenyropsis natalii natalii</i>	Natal Brown	1LC		3
<i>Danaus chrysippus orientis</i>	African Monarch, Plain Tiger	1LC	3	2
<i>Dira swanepoeli swanepoeli</i>	Swanepoel's Widow	1LC	16	2
<i>Eurytela dryope angulata</i>	Golden Piper	1LC		3
<i>Eurytela hiarbas angustata</i>	Pied Piper	1LC	1	2
<i>Hamanumida daedalus</i>	Guinea-Fowl Butterfly	1LC		3
<i>Heteropsis perspicua perspicua</i>	Eyed Bush Brown	1LC	4	2
<i>Hypolimnias anthedon wahlbergi</i>	Variable Diadem	1LC	4	2
<i>Hypolimnias misippus</i>	Common Diadem	1LC	1	2
<i>Junonia hierta cebrene</i>	Yellow Pansy	1LC	2	2
<i>Junonia natalica natalica</i>	Brown Commodore	1LC	3	2
<i>Junonia oenone oenone</i>	Blue Pansy	1LC	2	2
<i>Junonia orithya madagascariensis</i>	Eyed Pansy	1LC		3
<i>Junonia terea elgiva</i>	Soldier Pansy	1LC	7	2
<i>Lachnoptera ayresii</i>	Blotched Leopard	1LC		3
<i>Libythea labdaca laius</i>	African Snout	1LC		3
<i>Melanitis leda</i>	Twilight Brown	1LC		3
<i>Neita extensa</i>	Savanna Brown	1LC		3
<i>Neptis laeta</i>	Common Barred Sailer	1LC	2	3
<i>Neptis saclava marpessa</i>	Spotted Sailer	1LC	3	2
<i>Pardopsis punctatissima</i>	Polka Dot	1LC		3
<i>Phalanta phalantha aethiopica</i>	African Leopard	1LC	6	2
<i>Physcaeneura panda</i>	Dark-Webbed Ringlet	1LC		3
<i>Precis antilope</i>	Darker Commodore	1LC		3
<i>Precis archesia archesia</i>	Garden Commodore	1LC	3	2
<i>Precis octavia sesamus</i>	Gaudy Commodore	1LC	5	2
<i>Precis tugela tugela</i>	Dry-Leaf Or Eared Commodore	1LC	2	3
<i>Protogoniomorpha anacardii anacardii</i>	Mother-Of-Pearl	1LC		3
<i>Protogoniomorpha anacardii nebulosa</i>	Clouded Mother-Of-Pearl	1LC		3
<i>Protogoniomorpha parhassus</i>	Mother-Of-Pearl	1LC	4	2
<i>Pseudacraea boisduvalii trimenii</i>	Trimen's False Acraea	1LC	1	2
<i>Pseudonympha magoides</i>	False Silver-Bottom Brown	1LC	1	3
<i>Stygionympha wichgrafi wichgrafi</i>	Wichgraf's Hillside Brown	1LC	1	3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Telchinia anacreon</i>	Orange Acraea	1LC		3
<i>Telchinia burni</i>	Pale-Yellow Acraea	1LC		3
<i>Telchinia cabira</i>	Yellow-Banded Acraea	1LC	2	2
<i>Telchinia encendon encendon</i>	White-Barred Acraea	1LC		3
<i>Telchinia esebria</i>	Dusky Acraea	1LC	4	2
<i>Telchinia rahira rahira</i>	Marsh Acraea	1LC	1	3
<i>Telchinia serena</i>	Dancing Acraea	1LC	3	2
<i>Vanessa cardui</i>	Painted Lady	1LC	2	2
<i>Vanessa dimorphica dimorphica</i>	Northern Short-Tailed Admiral	1LC		3
<i>Ypthima asterope asterope</i>	African Ringlet	1LC	1	2
<i>Ypthima granulosa</i>	Granular Ringlet	1LC		3
<i>Ypthima impura paupera</i>	Impure Ringlet	1LC		3
PAPILIONIDAE	Swallowtails, swordtails & relatives			
<i>Graphium angolanus angolanus</i>	Angola White-Lady Swordtail	1LC		3
<i>Graphium antheus</i>	Large Striped Swordtail	1LC		3
<i>Graphium leonidas leonidas</i>	Veined Swordtail	1LC		3
<i>Graphium morania</i>	White Lady	1LC		3
<i>Graphium porthaon porthaon</i>	Cream Striped Swordtail	1LC		3
<i>Papilio constantinus constantinus</i>	Constantine's Swallowtail	1LC		3
<i>Papilio dardanus cenea</i>	Mocker Swallowtail, Flying Handkerchief	1LC	4	2
<i>Papilio demodocus demodocus</i>	Citrus Swallowtail	1LC	2	2
<i>Papilio echerioides echerioides</i>	White-Banded Swallowtail	1LC	1	3
<i>Papilio nireus lyaeus</i>	Green-Banded Swallowtail	1LC	5	2
<i>Papilio ophidicephalus entabeni</i>	Emperor Swallowtail	1LC	1	3
PIERIDAE	Tips, whites & relatives			
<i>Afrodryas leda</i>	Autumn Leaf Vagrant	1LC		3
<i>Appias epaphia contracta</i>	Diverse Albatross White	1LC	3	2
<i>Belenois aurota</i>	Brown-Veined White	1LC	2	2
<i>Belenois creona severina</i>	African Common White	1LC	5	2
<i>Belenois gidica abyssinica</i>	African Veined White	1LC	2	2
<i>Belenois zochalia zochalia</i>	Forest White	1LC		3
<i>Catopsilia florella</i>	African Migrant	1LC	5	2
<i>Colias electo electo</i>	African Clouded Yellow	1LC		3

FAMILY & SCIENTIFIC NAME	COMMON NAME	RED LIST STATUS (Mecenero <i>et al.</i> 2013)	No. OF QDS RECORDS (LepiMAP 2016)	LoO ON SITE
<i>Colotis annae annae</i>	Scarlet Tip	1LC	2	2
<i>Colotis antevippe gavisa</i>	Red Tip	1LC	1	2
<i>Colotis auxo auxo</i>	Sulphur Orange Tip	1LC		3
<i>Colotis calais calais</i>	Topaz Arab	1LC		3
<i>Colotis euiippe omphale</i>	Smoky Orange Tip	1LC	1	2
<i>Colotis evagore antigone</i>	Small Orange Tip	1LC	2	2
<i>Colotis evenina evenina</i>	Orange Tip	1LC		3
<i>Colotis ione</i>	Bushveld Purple Tip	1LC		3
<i>Colotis pallene</i>	Bushveld Orange Tip	1LC		3
<i>Colotis regina</i>	Queen Purple Tip	1LC		3
<i>Colotis vesta argillaceus</i>	Veined Tip	1LC		3
<i>Dixeia pigea</i>	Ant-Heap White	1LC	16	2
<i>Eronia cleodora</i>	Vine-Leaf Vagrant	1LC	1	3
<i>Eurema brigitta brigitta</i>	Broad-Bordered Grass Yellow	1LC	2	2
<i>Eurema hecabe solifera</i>	Lowveld Yellow	1LC	2	2
<i>Leptosia alcesta inalcesta</i>	African Wood White	1LC	1	3
<i>Mylothris agathina agathina</i>	Common Dotted Border	1LC	2	2
<i>Mylothris rueppellii haemus</i>	Twin Dotted Border	1LC		2
<i>Nepheronia buquetii buquetii</i>	Buquet's Vagrant	1LC	2	3
<i>Nepheronia thalassina sinalata</i>	Cambridge Vagrant	1LC	1	3
<i>Pinacopteryx eriphia eriphia</i>	Zebra White	1LC	1	2
<i>Pontia helice helice</i>	Common Meadow White	1LC		2
<i>Teracolus agoye agoye</i>	Speckled Sulphur Tip	1LC		3
<i>Teracolus eris eris</i>	Banded Gold Tip	1LC		3
<i>Teracolus subfasciatus</i>	Lemon Traveller	1LC		2
Status: 1 = Global; 2 = Regional; LC = Least Concern				
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate				
Sources: Mecenero <i>et al.</i> (2013); LepiMAP (2016)				

12.6. Odonata list for study area

FAMILY & SCIENTIFIC NAME	COMMON NAME	BIOTIC INDEX SCORE	GLOBAL RED LIST STATUS (Samways 2006)	RSA RED LIST STATUS (Samways 2006)	No. OF QDS RECORDS (OdonataMAP 2016)	LoO ON SITE
COENAGRIONIDAE	Pond damselfs					
<i>Ceriagrion glabrum</i>	Common Citril	0			3	3
<i>Ischnura senegalensis</i>	Tropical / Marsh Bluetail	0				2
<i>Pseudagrion hageni tropicanum</i>	Painted Sprite (northern form)	2				3
<i>Pseudagrion hamoni</i>	Swarthy / Drab Sprite	2				3
<i>Pseudagrion makabusiense</i>	Makabusi / Green-striped Sprite	4		VU		3
<i>Pseudagrion salisburyense</i>	Slate Sprite	1			1	3
<i>Pseudagrion sudanicum</i>	Blue-sided / Blue-spotted / Sudan Sprite	4				3
LESTIDAE	Spreadwings					
<i>Lestes virgatus</i>	Smoky Spreadwing	2				3
LIBELLULIDAE	Skimmers					
<i>Brachythemis leucosticta</i>	Southern Banded Groundling	2			1	3
<i>Orthemtrum julia</i>	Julia Skimmer	1			3	3
<i>Pantala flavescens</i>	Wandering Glider / Pantala	0				2
<i>Sympetrum fonscolombii</i>	Red-veined Darter / Nomad	0				2
<i>Tamea basilaris</i>	Keyhole Glider	0				3
<i>Tamea limbata</i>	Ferruginous / Voyaging Glider	0				3
<i>Trithemis kirbyi</i>	Orange-winged / Kirby's Dropwing	0			1	3
<i>Urothemis edwardsii</i>	Blue Basker	2			1	3
MACROMIIDAE	Cruisers					
<i>Phyllomacromia contumax</i>	Two-banded Cruiser	2				3
PLATYCNEMIDIDAE	Featherlegs					
<i>Allocnemis leucosticta</i>	Goldtail	5			1	3
<i>Elatoneura glauca</i>	Common Threadtail	1			2	3

Status: VU = Vulnerable

Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate

Sources: Samways (2006); Samways (2008); OdonataMAP (2016)

12.7. Scorpion list for study area

FAMILY & SCIENTIFIC NAME	LoO ON SITE
BUTHIDAE	
<i>Parabuthus mossambicensis</i>	3
<i>Parabuthus transvaalicus</i>	2
<i>Pseudolychas pegleri</i>	2
<i>Uroplectes carinatus</i>	3
<i>Uroplectes olivaceus</i>	2
<i>Uroplectes triangulifer</i>	2
<i>Uroplectes vittatus</i>	2
HORMURIDAE	
<i>Cheloctonus jonesii</i>	3
<i>Opistacanthus asper</i>	3
<i>Opistacanthus validus</i>	3
SCORPIONIDAE	
<i>Opisththalmus glabrifrons</i>	2
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate	
Sources: Leeming (2003); ScorpionMap (2016)	

12.8. CVs of Specialists

CURRICULUM VITAE

Name: **SUSAN ABELL (neé BRADLEY)**
Position: Senior Ecologist and Co-Owner of Natural Scientific Services
Date of Birth: 29 March 1976
Nationality: South African
Languages: English (mother tongue), Afrikaans

EDUCATIONAL QUALIFICATIONS

- ☒ MSc Resource Conservation Biology (Ecology) (2000 – 2001)
- ☒ B Sc Hons University of the Witwatersrand, Johannesburg (1999)
- ☒ B Sc University of the Witwatersrand, Johannesburg (1998)

KEY QUALIFICATIONS

☒ **Environmental Impact Assessment:**

Compiled numerous Environmental Impact Assessments, Scoping Reports and Environmental Management Programmes as required by the Environment Conservation Act (Act No. 73 of 1989) and the National Environmental Management Act (Act 107 of 1998).

☒ **Specialist Assessments:**

Over 14 years performing ecological and vegetation surveys within Southern Africa. Expertises are strong in the Savanna and Grasslands within Gauteng, North West, Limpopo, Mpumalanga, KwaZulu Natal, Lesotho and Botswana. Further experience within the Karoid Shrub, Kalahari and Fynbos Areas.

GIS Mapping, Database management, GIS Modelling undertaken within specialist projects

☒ **Strategic / Spatial Planning:**

Co-ordinated and managed strategic spatial planning projects in Gauteng, North West Province and Mpumalanga including the:

- State of Environment Reporting
- Gauteng Agricultural Potential Atlas (GAPA)
- North West Biodiversity Site Inventory and Database Development Atlas
- Tshwane Macro Open Space Policy
- Biodiversity Database for Optimum Collieries (BHP Billiton)

☒ **Conference Presentations:**

Undertaken numerous presentations at conferences (SAAB; IAIA)

☒ **Educational Training:**

Education training for organisations such as Wits University and Induction Training in Biodiversity Conservation for Mining Operations

EMPLOYMENT EXPERIENCE

☒ **Member & Senior Ecologist: Natural Scientific Services. Johannesburg (November 2004-Present)**

- Project management and administration
- Project management and compilation of biodiversity assessments within savanna, karoid, fynbos and grassland systems including:
 - Ecological assessments
 - Vegetation/Habitat assessments;
 - Red Data Scans;
 - Ecological Screening, Opinions & Statements;
 - Wetland Assessments.
- Ecological Sensitivity Mapping;
- Project management and compilation of Biodiversity Management & Action Plans (BMAPS);
- Reserve Management Plans (examples below):
 - Blyde River Reserve Strategic Management Plan
 - Monate Reserve Management Plan
- Alien Invasive Management Plans;
- Project Management for Rehabilitation and Land-Use Plans;
- Management and specialist input into Green Star Rating Projects (Ecological Component);
- Environmental Impact Assessments and Scoping Reports;
- Project management and compilation of a number of Environmental Impact Control Reports (EICR) for waste management projects;
- Compilation of Conceptual Closure Plans for a number of mining operations;
- Tender and proposal compilation;
- Marketing;
- Liaison with clients and government officials; and
- Involvement in Specific GIS-related projects (examples below):
 - Blyde Strategic Management Plan
 - Visual Assessment for Natalspruit Hospital
 - Biodiversity Database – Optimum Collieries

☒ **Project Manager: Strategic Environmental Focus (SEF) (November 2003-October 2004)**

- Project management, Marketing and administration
- Project Management of and input into Ecological Assessments
- Tender and proposal compilation
- Liaison with clients and government officials
- Involvement in GIS-related projects.
 - Tshwane Open Space Project
 - Numerous State of the Environment Reports

☒ **Environmental Manager: SEF, Pretoria (April 2001- November 2003)**

- Project management and administration
- Compilation of environmental assessments and scoping reports including:
- Tourism & Recreational developments
- Residential developments
- Commercial and industrial developments
- Liaison with government officials
- Management and input into GIS-related projects:
 - Gauteng Agricultural Potential Atlas (GAPA)
 - Gauteng Open Space Plan (GOSP)
 - North West Biodiversity Database Development
- Ecological Assessments / vegetation surveys / opinions/ Red Data Scans for various industries – mining, industrial, business, residential and sampling
- Sensitivity mapping



University of the Witwatersrand (Wits) 1999 – 2001

- Teaching Assistant:
- Mammalian surveys within Wits Rural Facility, Mpumalanga
- Vegetation sampling SAFARI 2000- Kruger National Park (Paper: Koedoe Journal 44/1 2001)
- Vegetation sampling Nylsvley Nature Reserve (2000)
- Monitoring and growth experiments (1998-1999) Electron and Transmission microscopy




MEMBERSHIPS IN PROFESSIONAL SOCIETY

-  South African Council for Natural Scientific Professions (*Pr.Sci.Nat*)
-  Botanical Society of South Africa
-  International Association for Impact Assessment (IAIA)

PAPERS PUBLISHED

-  Koedoe Journal 44/1 2001
-  Proceedings: Microscopy Society of South Africa, 1999

PAPERS PRESENTED

-  Proceedings of the Microscopy Society of Southern Africa, 1999
-  Population dynamics and regeneration ecology of *Acacia nilotica* and *Acacia tortilis* in Nylsvley Nature Reserve, SAAB Conference 2000
-  Tools for Cooperative Governance: North West Biodiversity Site Inventory And Database Development, IAIA Conference 200

CURRICULUM VITAE

Name: CAROLINE ANGELA LÖTTER (YETMAN)
Firm: Natural Scientific Services CC, Randburg
Position: Terrestrial Ecologist – Level 2
Date of Birth: 6 November 1979
Nationality: South African, British
Language: English, Afrikaans

KEY EDUCATIONAL QUALIFICATIONS

- ☒ PhD Zoology (2012). Conservation biology of the Giant Bullfrog, *Pyxicephalus adspersus*. (University of Pretoria).
- ☒ MSc African Mammalogy (2002). Effects of body size on the activity budgets of African browsing ruminants. (University of Pretoria).
- ☒ BSc Honours Zoology (2001). Terrain ruggedness and forage patch use by African browsing ungulates. (University of Pretoria).
- ☒ BSc Ecology (2000). (University of Pretoria).

KEY EXPERIENCE

☒ Specialist Assessments

- International Experience
 - Terrestrial faunal assessments in Sierra Leone (2011 & 2012).
 - Terrestrial faunal assessment in Lesotho (2012).
- Local Experience
 - Biodiversity Management Plans in Gauteng Province (2014-present).
 - Terrestrial faunal assessments in the Free State, Gauteng, Kwa-Zulu Natal, Limpopo, Mpumalanga, Northern Cape and North-West provinces (2011-present).
 - Long-term bat monitoring for wind farm developments in the Western, Eastern, Northern Cape and Kwa-Zulu Natal provinces (2012-2013).
 - Giant Bullfrog assessments in Gauteng, Limpopo, Mpumalanga and North-West provinces (2004-2011).

☒ Research

- Analysis of acoustic bat data using AnalookW (2013).
- Species distribution modelling in MaxEnt (2008-2013).
- Geographic Information Systems (in ArcView and ArcGIS) (2001-2013).
- DNA sequencing and analysis (2003-2011).
- Histology (2003-2011).
- Amphibian and mammal radio- and spool-tracking (2003-2010).
- Amphibian and mammal mark-recapture (2001-2010).
- Extensive data analysis in Statistica (2001-2013).
- Vegetation sampling (1999-2001).
- Cricket behavioural studies (1999-2001).

Applied Conservation

- Biodiversity Management Plans for large gold mines in Gauteng Province (2014-present).
- Monitoring and mitigating impacts on bats at wind farms in South Africa, NSS (2012-2013).
- Giant Bullfrog conservation in South Africa, Endangered Wildlife Trust (2004-2007).
- Captive animal care at the National Zoological Gardens (1993-1998).

Lecturing

- Third year Animal Physiology (2007).
- First year Amphibian Practicals (2007-2012).
- Giant Bullfrogs (2003-2012).

KEY EMPLOYMENT EXPERIENCE

Natural Scientific Services, Johannesburg (November 2011 – present)

- Project Management
 - Biodiversity Management Plans in Gauteng Province (2014-present).
 - Biodiversity Assessments in Gauteng and Mpumalanga provinces (2012-present).
 - Long-term bat monitoring studies in the Western and Northern Cape provinces (2012-2013).
- Field work, data analysis and report writing
 - Terrestrial faunal assessments in Sierra Leone, Lesotho, and South Africa (2011-present).
 - Long-term bat monitoring for wind farm developments in the Western, Eastern, Northern Cape and Kwa-Zulu Natal provinces (2012-2013).

Exclusive Books, Woodlands Boulevard, Pretoria (2008-2011)

- Night-staff management and book sales.

University of Pretoria, Pretoria (1999-2011)

- Government Environmental Inspectorate exam invigilation and marking (2009-2011).
- Lecturing (2007-2011).
- Academic Programme Organizer for Dartmouth College, U.S.A. (2003-2007).
- Editorial Assistant for The Kruger Experience (2005) by Du Toit.
- Research Assistant for behavioural and evolution studies on crickets (1999-2001).

Endangered Wildlife Trust, Johannesburg (2004-2008)

- Project Executant of the Giant Bullfrog Project.

Biodiversity Foundation of Africa, Zimbabwe (December 2001)

- Insect and amphibian collecting expedition on the Barotse Floodplain, Zambia.

National Zoological Gardens, Pretoria (1993-1998)

- Public Educator.
- Assistant Nature Conservator.

- Junior Nature Conservator.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- ☒ International Association for Impact Assessment: 2014-present.
- ☒ Gauteng and Northern Regions Bat Interest Group: 2014-present.
- ☒ South African Council for Natural Scientific Professions: 2008-present.
- ☒ Herpetological Association of Africa: 2004-present.
- ☒ Zoological Society of Southern Africa: 2003-present.

PUBLICATIONS

- Yetman, C.A., Clark, T. & A. Dippenaar-Schoeman (In press). Pyxicephalidae. *Pyxicephalus adspersus*, (Tschudi, 1838). Giant Bullfrog. Predation. *African Herp News*.
- Yetman, C.A., Verburgt, L. & S.D. Laurence (2015). Geographical distributions *Pyxicephalidae Pyxicephalus adspersus* Tschudi, 1838 Giant Bullfrog. *African Herp News* 62: 50-53.
- Scott, E., Visser, J.D., Yetman, C.A. & Oliver, L. (2013). Revalidation of *Pyxicephalus angusticeps* Parry, 1982 (Anura: Natatanura: Pyxicephalidae), a bullfrog endemic to the lowlands of eastern Africa. *Zootaxa* 3599: 201–228.
- Verburgt, L. & Yetman, C.A. (2012). Geographical Distributions: Amphibia: Anura: Pyxicephalidae: *Pyxicephalus adspersus* Tschudi, 1838 Giant Bullfrog. *African Herp News* 57: 18-20.
- Yetman, C.A., P. Mokonoto & J.W.H. Ferguson (2012). Conservation implications of the age/size distribution of Giant Bullfrogs (*Pyxicephalus adspersus*) at three peri-urban breeding sites. *Herpetological Journal* 22: 23-32.
- Yetman, C.A., P. Mokonoto & J.W.H. Ferguson (2012). Conservation implications of the age/size distribution of Giant Bullfrogs (*Pyxicephalus adspersus*) at three peri-urban breeding sites. *Herpetological Journal* 22: 23-32.
- Yetman, C.A. & J.W.H. Ferguson (2011). Conservation implications of spatial habitat use by adult Giant Bullfrogs (*Pyxicephalus adspersus*). *Journal of Herpetology* 45: 56-62.
- Yetman, C.A. & J.W.H. Ferguson (2011). Spawning and non-breeding activity of adult Giant Bullfrogs (*Pyxicephalus adspersus*). *African Journal of Herpetology* 60: 13-29.
- Bateman, P.W., J.W.H. Ferguson & C.A. Yetman (2006). Courtship and copulation, but not ejaculates, reduce the longevity of female field crickets (*Gryllus bimaculatus*). *Journal of Zoology, London* 268: 341-346.
- Du Toit, J.T. & C.A. Yetman (2005). Effects of body size on the diurnal activity budgets of African browsing ruminants. *Oecologia* 143: 317-325.

AWARDS

- 2010-2013: Podium positions for various 10km, 21km, 42km and +50km road and trail-running races in Gauteng, Mpumalanga, Limpopo and North-West provinces.
- 2012: PhD, Academic Honorary Colours, University of Pretoria.
- 2009: Best PhD Student Presentation, AGM, Dept. of Zoology & Entomology, University of Pretoria.
- 2005: Nominated: Science & Technology Category, Shoprite Checkers SABC 2 Woman of the Year.
- 2003: Best Student Presentation, Conference, Zoological Society of Southern Africa.
- 2003: MSc, Academic Honorary Colours, University of Pretoria.

OTHER TRAINING

- Permaculture (2016).
- First Aid (2013).
- Comrades Marathon (2012 & 2013)
- Climbing and Fall Arrest at height (2012).
- Basic 4x4ing (2010).
- Snake handling (2008).

CONFERENCES

- 2014 & 2015: Annual Oppenheimer De Beers Group Diamond Route Research Conference, Johannesburg, Gauteng.
- 2013: Annual Symposium of the Zoological Society of Southern Africa, Tshipise, Limpopo.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX E: Comments and Responses Report



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Proof of Site Notice: *Content of Site Notice (in English)*

Wanga Poultry Farm (Pty) Ltd Project Site (Limpopo)

NOTICE OF A BASIC ASSESSMENT (BA) PROCESS

Notice is hereby given, in terms of the Environmental Impact Assessment (EIA) Regulations, under sub-regulation 41(1) and sub-regulation 41(4), published in Government Gazette No 38282 of 04 December 2014, of the National Environmental Management Act, 1998 (Act No 107 of 1998), that **Wanga Poultry Farm (Pty) Ltd**, proposes a **commercial layer hens enterprise** in **Mashau Bodwe Village**, in the **Vhembe District, Limpopo**.

The Council for Scientific and Industrial Research (CSIR), as the independent Environmental Assessment Practitioner, will manage the required Basic Assessment process for the proposed project. The project will be registered with the Limpopo Department of Economic Development, Environment & Tourism (LEDET). The need for a Basic Assessment is triggered by the following activities listed in Government Notice Regulations (GNR) 983 of 4 December 2014:

Government Notice	Listed Activity Number
GNR 983, 4 December 2014	5.(ii)
GNR 983, 4 December 2014	27

To obtain further information with regards to the project and Basic Assessment process, or to register as Interested and Affected Party (I&AP), please contact:



Ms. Rirhandzu Marivate
 PO Box 320, Stellenbosch, 7599
 Tel: 021 888 2432
 Fax: 021 888 2693
 Email: rmarivate@csir.co.za

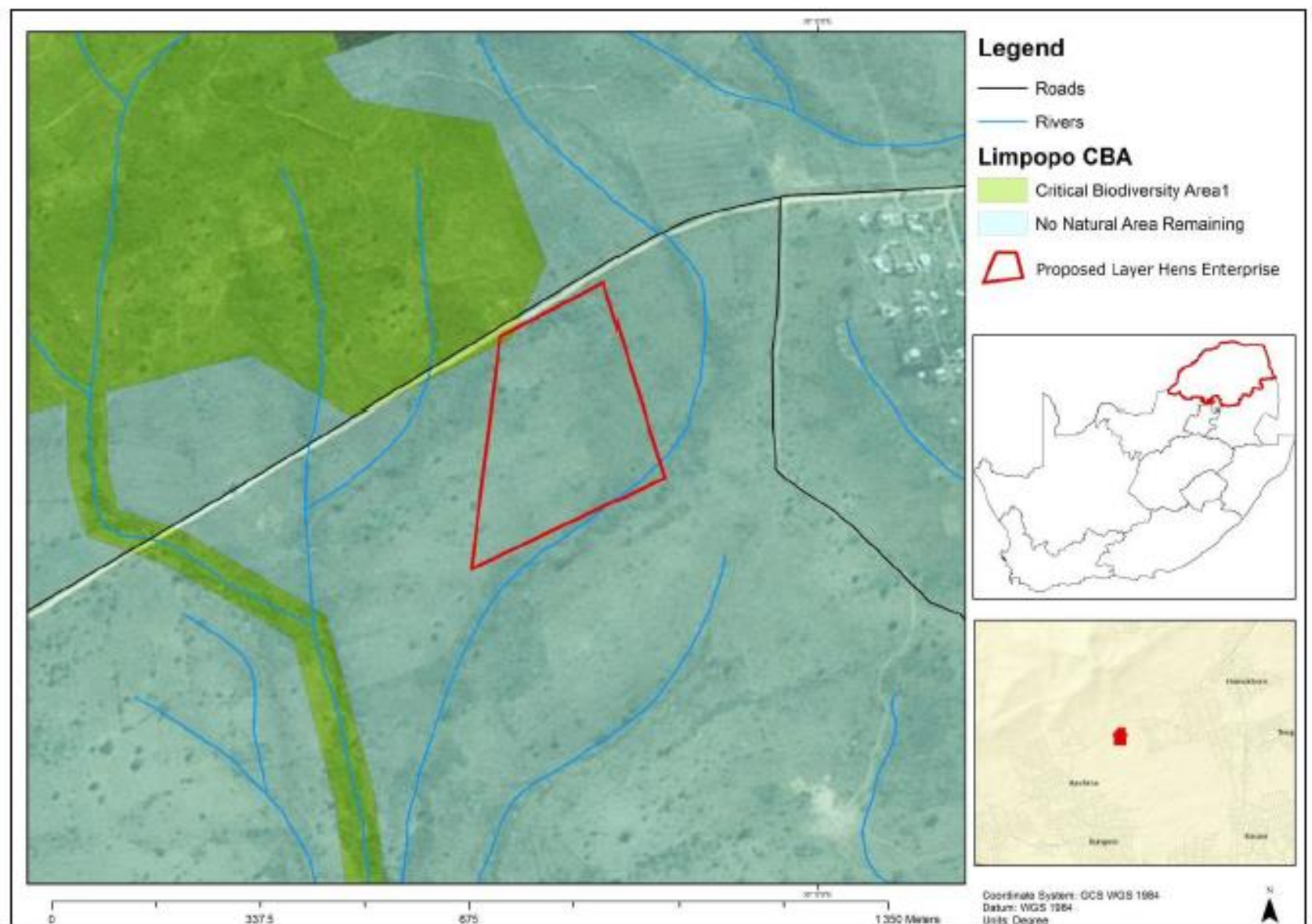


Figure 1: General Locality Map depicting Mashau-Bodwe Village, where project is proposed

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Site Notice places at the gate of the proposed site



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Written Notices to Interested and Affected Parties: Project Announcement



CSIR Consulting Services
PO Box 320
Stellenbosch
7509
South Africa
Tel: +27 21 888 2432
Fax: +27 21 888 2693
Email: marivate@csir.co.za

27 May 2016

Dear Interested and/or Affected Party

BASIC ASSESSMENT FOR THE DEVELOPMENT OF A 0.6 HECTARE CHICKEN LAYER FACILITY ON A 3 HECTARE FARM IN MASHAU-BODWE VILLAGE, MAKHADO DISTRICT, LIMPOPO (CSIR/02100/IMPLEMENTATION UNIT/IR/2016/0005/A)

The National Department of Environmental Affairs (DEA) and the Council for Scientific and Industrial Research (CSIR) have initiated the Special Needs and Skills Development Programme, whereby small-medium micro-enterprises and community trusts who are lacking financial means are provided with *pro-bono* environmental services to decrease the burden of the cost associated with starting a business. Wanga Poultry Farm (Pty) Ltd has been identified as an eligible client for this service and is proposing to construct a chicken broiler facility and associated infrastructure, on approximately 0.6 ha of the 3 hectare farm. The plan is to have 120 000 egg laying hens at a time.

In terms of Government Notice Regulations (GNR) 983, 984 and 985 of 4 December 2014 of the National Environmental Management Act (Act 107 of 1998) published in Government Gazette 38282 on 4 December 2014, Environmental Authorisation from the Competent Authority, in this case the Limpopo Department of Economic Development, Environment & Tourism (DEDET), is required prior to the undertaking of any activity triggered within GNR 983, 984 and/or 985. The need for a Basic Assessment process is required by the inclusion of the activities listed within GNR 983: Activity 5. The CSIR, as the independent Environmental Assessment Practitioner (EAP), will be managing the Basic Assessment and Public Participation Process for this proposed project.

In line with the Environmental Impact Assessment requirements of December 2014, Interested and Affected Parties (I&APs) must be notified and are requested to register for this project in order to receive future correspondence on this project and/or provide comments on issues of concern that will be considered during the Basic Assessment process. Please find enclosed with this letter a Background Information Document (BID) and a Comment and Registration form. You have until on or before 27 June 2016 to register and submit your comments for this project. To register and submit comments for the project please complete the Registration Form. Use the CSIR Reference Number above together with your full name, contact details (preferred method of notification, e.g., full postal or email address), fax/phone number(s) and an indication of any direct business, financial, personal or other interest you have in the application to the contact person listed below.

From this point onwards, all communication and documents will be in English. Should you require further information in Xitsonga, please do not hesitate to contact the CSIR and we will assist.

Yours sincerely,

Ms. Rirhandzu Marivate

Postal address: PO Box 320, Stellenbosch, 7599, South Africa

Tel: 021 888 2432

Fax: 021 888 2693

E-mail: rmarivate@csir.co.za

Website: <http://www.csir.co.za/ems/specialneeds/>

Board members: Prof T. Majozl (Chairperson), Adv G. Badela, Ms P. Baleni, Dr P. Goyns, Dr A. Liobell, Dr R. Masango, Ms M. Maseko, Mr J. Netshitenzhe, Ms A. Noah, Prof M. Phakeng, Dr S. Sibisi (CEO)

www.csir.co.za

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Comment form attached with the Letter

CSIR EMS Reference Number: CSIR/02100/Implementation Unit/IR/2016/0005/A

COMMENT AND REGISTRATION FORM (MAY 2016)

Name:	Telephone:
Organisation:	Fax:
Position:	Email:
Physical address:	Postal address:

Please indicate if you would like to register as an Interested and Affected Party (I&AP). Registration is required in order to receive further correspondence during the Basic Assessment Process. Please tick the appropriate box.	
YES	<input type="checkbox"/>
NO	<input type="checkbox"/>
Please indicate if you have any interest (business, financial, personal or other) in the application for Environmental Authorisation:	
<input type="text"/>	

Please describe any issues or concerns you may have regarding the proposed project, which you think should be considered during the Basic Assessment Process.
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>
<input type="text"/>

Please provide details of any other individuals or organisations that should be registered as I&APs:
<input type="text"/>
<input type="text"/>

Please complete this Comment and Registration Form by (27 June 2016) and submit it to:

<p>Ms. Rirhandzu Marivate P O Box 320, Stellenbosch, 7599 Tel: 021 888 2432 Fax: 021 888 2693 E-mail: rmarivate@csir.co.za</p>

Board members: Prof T. Majozi (Chairperson), Adv G. Badela, Ms P. Baleni, Dr P. Goyns, Dr A. Llobell, Dr R. Masango, Ms M. Maseko, Mr J. Netshitenzhe, Ms A. Noah, Prof M. Phakeng, Dr S. Sibisi (CEO)

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APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Postal List: Project Announcement (includes letter, comment form and BID)

<p>Department of Economic Development, Environment & Tourism Mr Abel Matsimela 20 Hans van Rensburg Street Polokwane 0700</p>	<p>Department of Economic Development, Environment & Tourism Mr Solly Kgopong 19 Biccard Street Polokwane 0700</p>	<p>Department of Economic Development, Environment & Tourism Ms NM Mdau Old Parliamentary Building Block E & F 0950</p>
<p>Department of Agriculture: Limpopo Mr Terries Salani Ndove 67 Biccard Street Temo Towers Polokwane 0700</p>	<p>Department of Agriculture: Limpopo Ms M.E. Raphunga Makwela Government Office SIBASA 0970</p>	<p>Department of Cooperative Governance, Human Settlements & Traditional Affairs Mr TV Khuzwayo Hensa Towers Building 20 Rabe Street Polokwane 0700</p>
<p>Department of Cooperative Governance, Human Settlements & Traditional Affairs Ms SH Mabuda Private Bag X9485 Polokwane 0700</p>	<p>Vhembe District Municipality SE Makhomisane Private Bag X 5006 Thohoyandou 0950</p>	<p>Vhembe District Municipality MP Themba Private Bag X 5006 Thohoyandou 0950</p>
<p>Makhado Local Municipality David Mutavhatsindi Private Bag X2596 Louis Trichardt 0920</p>	<p>Makhado Local Municipality Sakkie Mutshinyalie Private Bag X2596 Louis Trichardt 0920</p>	<p>Wanga Poultry Farm (Pty) Ltd Ntaka Calson Nembanzheni PO Box 379 Mashau 0943</p>
<p>Mashau Tribal Authority T.R.V. Mashau PO Box 1 Mashau 0943</p>	<p>National Department of Environmental Affairs Mmatlala Rabothata Fedsure Building Private Bag X447 315 Pretorius Street Pretoria 0002</p>	<p>National Department of Rural Development and Land Reform Una-Bonginkosi Zulu Fedsure Building Private Bag X447 315 Pretorius Street Pretoria 0002</p>
<p>South African National Parks (SANParks) Dr. Howard Hendriks PO Box 787 Pretoria 0001</p>	<p>National Department of Agriculture, Forestry and Fisheries Mashudu Marubini Private Bag X138 Pretoria 0001</p>	<p>South African Heritage Resources Agency (SAHRA) Marie South PO Box 4637 Cape Town 8000</p>
<p>AgriLand Anneliza Collett Private Bag X120</p>	<p>Grasslands Society of South Africa Feyni Du Toit P.O. Box 41 Hilton 3245</p>	<p>Limpopo Tourism Agency Executive Manager PO Box 2814 Polokwane 0700</p>
<p>Limpopo Economic Development Agency Mr Humphrey Maphutha Enterprise Development Finance Main Road Lebowakgomo Polokwane, 0699</p>	<p>Limpopo Economic Development Agency Senior Manager Makhado Local Municipality Offices 98 Krogh Street Civic Centre 0920</p>	

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Proof of Newspaper advertisement tear sheet

Contents of Newspaper Advertisement placed in the Limpopo Mirror on 27 May 2016

Notice of Basic Assessment for the development of a Chicken Layer Facility on a 3 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

CSIR Reference No: CSIR/CAS/EMS/IR/2016/0001/A

Notice is given of a Basic Assessment (BA) process being undertaken on behalf of **Wanga Poultry Farm (Pty) Ltd** (the Project Applicant) for the **development of a 0.6 hectare Chicken Layer Facility on a 3 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.**

In terms of the NEMA EIA Regulations published in Government Notice Regulation (GNR) 983 on 4 December 2014 Government Gazette No 38282, a BA process is required as the project triggers the following listed activities: GNR 983 Activity 5 (ii). The Council for Scientific and Industrial Research (CSIR) is the Environmental Assessment Practitioner (EAP) who will be managing the process.

You are invited to register as an Interested and/or Affected Party (I&AP) and/or to provide any written comments on the BA process. To obtain further information, to comment and/or to register as an I&AP, please site the CSIR Reference Number and provide your full name, full postal address, phone numbers, email address and state your area of interest and/or concern to: **Ms. Rirhandzu Marivate, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: rmarivate@csir.co.za.** You have until on or before 27 June 2016 to do so (30 days from the date of this publication - including weekends, but excluding public holidays).



CSIR

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Newspaper Advertisement placed in the Limpopo Mirror on 27 May 2016



The Grade 6 and 7 pupils of Tshabulumu Primary School at Tshakhuma received 100 mathematics sets from the Liberty Group, in conjunction with Rer's Insurance Brokers, last Wednesday. The principal of the school, Ms Sarah Tshikola, said that some of the learners at her school were from poor families and that they could not afford to buy maths sets. The regional head of Broker Distribution in the Liberty Group, Mr Lesiba Tsohe, said that his company was ready to equip learners who wanted to master mathematics. Mr David Murrer of Rer's added that his company was ready to change the lives of learners for the better. Photographed during the event were, from left to right, Mr Enoch Mavhungu (broker consultant), Ms Sarah Tshikola, Mr Petrie Botha (Liberty), the managing director for Rer's Insurance Company, Mr David Murrer, and the regional head of distribution of the Liberty Group, Mr Lesiba Tsohe, with some of the pupils showing their maths sets. Photo: Sikh Ndzirhezi.

Mirror

Published by Zonnet CC, trading as Limpopo Mirror of Step no. 5 Media Centre, next to the Post Office, Thebeiyanda. Topographically prepared by the proprietors and printed by D Brika, 1 Jeppe Street, Louis Trichardt.

POSTAL ADDRESS:
PO Box 1800, Louis Trichardt, 0300

TELEPHONES:
Thebeiyanda: (015) 962 9306
Thebeiyanda fax: (015) 962 9306
Louis Trichardt: (015) 516 4060/7
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Editor: wilsa@zonnet.co.za
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Website: http://www.limpopomirror.co.za

WORLD YOUNG READER PRIZE 2005
www.worlyoungreader.org

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The newspaper is distributed by Fair North Media Distributors. Any queries regarding distribution can be directed to George Jaros van Rensburg (082 416 2320).

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Zonnet



The group Mavhungu Muzerli Sisters were crowned winners of the Vhavenda Fashion Show during a ceremony last Tuesday in Thebeiyanda. Photo: Fatuzwani Mgwenyela.

Notice of Basic Assessment for the development of a Chicken Layer Facility on a 3 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

CSIR Reference No: CSIR/CASG/HS/2016/00010.

Notice is given of a Basic Assessment (BA) process being undertaken on behalf of Wange Family Farm Pty Ltd (the Project Applicant) for the development of a 0.6 hectare Chicken Layer Facility on a 3 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

In terms of the NEMA BA Regulations published in Government Notice Regulation (GNR) 993 on 4 December 2014, Government Gazette No 38282, a BA process is required as the project triggers the following listed activities: GNR 993 Activity 5 (a), the Council for Scientific and Industrial Research (CSIR) is the Environmental Assessment Practitioner (EAP) who will be managing the process.

You are invited to register as an Interested and/or Affected Party (I&A) and/or to provide any written comments on the BA process. To obtain further information, to comment and/or to register as an I&A, please visit the CSIR Reference Number and provide your full name, full postal address, phone number, email address and state your area of interest and/or concern to: Ms. Mosebela Muzetwa, CSIR, PO Box 320, Chalfonts 7599. Phone: (021) 866 3432, Fax: (021) 866 2693 or Email: mosebela@csir.co.za. You have until on or before 27 June 2016 to do so (30 days from the date of this publication - including weekends, but excluding public holidays).

CSIR



Rofhiwa "Ramsy" Rampfumedzi

Most people listen to music playing on radio stations and get to respect the presenter, because of the quality of the music which that presenter plays. People hardly think or even pay attention to the fact that there was someone who specially focused on compiling that quality music for a specific show on radio. A talented technician at Philapha FM, Rofhiwa "Ramsy" Rampfumedzi, is also a music compiler who has a keen ear for sound. A resident of Tshakhuma, Rofhiwa told Limpopo Mirror that he had grown up surrounded by different genres of music at home and that was the reason why he had a deep love of music. "When I had reached high school level, I developed a stronger sense of love towards music," he said. "Even though I did not have a noticeable aptitude for making music, I had this unquenchable fire that kept music alive in my soul."

He confessed that his love for soccer nearly made him leave school for good. "I loved soccer a lot, and I was nearly swayed from school by my involvement in soccer," he said. "I played with big names who are now playing in the PSL. However, at some stage my family was worried about my loving soccer and focusing on it so much, because they wanted me to have some education."

After completing his Grade 12, Rofhiwa went to study sound engineering at Pretoria College. Sometimes he would go to Rainbow FM studios and ask presenters and technicians a lot of questions about the radio industry. "They were all keen to answer and provide me with all the relevant, helpful information," he said.

"After completing my qualification, I went to ask for a job at the Rainbow FM and I was offered a part-time slot as a technician. My duties were to compile music."

At some stage he decided to come back home to Limpopo, so that he might contribute towards building up his province as a technician in the radio journalism industry.

"I finally joined Univen FM as a music compiler," he said. "Later on I was made a programme manager and acting station manager." He saw an advert for an opportunity at Philapha FM. "I applied like everyone else and I was lucky enough to get an opportunity to become a music compiler," he said. "When I got to Philapha FM, I was also appointed as a sports champion for Limpopo SABC."

He urged the youth to focus on education instead of getting into education at a backdrop, because without education you will get nowhere in life," he said.

Thala Phala FM
THE SHONA YOUTH STATION

SABC

POLOKWANE STUDIOS: (015) 297 1700 / 297 4306
OFFICE: (015) 290 0000/1; FAX: (015) 290 0170
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APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Written Notices (Letter & E-mail), to Interested and Affected Parties: 30 day comment period on DBAR



Dear Stakeholder,

CSIR Environmental Management Services

PO Box 320
Stellenbosch
7599
South Africa
Tel: +27 21 888 2432

1 February 2017

Notice of Release of Draft Basic Assessment Report for comment

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.

The National Department of Environmental Affairs (DEA) and the Council for Scientific and Industrial Research (CSIR) have initiated the Special Needs and Skills Development Programme, whereby small-medium micro-enterprises and community trusts who are lacking financial means are provided with *pro-bono* environmental services to decrease the burden of the cost associated with starting a business. Wanga Poultry Farm (Pty) Ltd has been identified as an eligible client for this service and is proposing to construct chicken layer facility, and associated infrastructure, on approximately 0.6 ha of the 7.8 hectare farm. The plan is to have 120 000 egg laying chickens at a time.

In terms of Government Notice Regulations (GNR) 983, 984 and 985 of 4 December 2014 of the National Environmental Management Act (Act 107 of 1998) published in Government Gazette 38282 on 4 December 2014, Environmental Authorisation from the Competent Authority, in this case Limpopo Department of Economic Development, Environment and Tourism (LEDET) is required prior to the undertaking of any activity triggered within GNR 983, 984 and/or 985.

In line with the Environmental Impact Assessment requirements of December 2014, as a registered interested and Affected Party (I&AP) on the project database, you are hereby notified of the release of the Draft BA Report to all I&APs for a 30-day review period, which will extend from 1st February to 2nd March 2017 (excluding public holidays). Please submit any comments on the Draft BA Report to the CSIR Project Manager at the contact details provided above by 2nd March 2017.

The next step in the BA Process will entail compiling the Final BA Report and including all comments received from I&APs during the 30-day review of the Draft BA Report. Once finalised, the Final BA Report will be submitted to LEDET for decision making. As a registered I&AP on the project database, you will be notified in writing of the submission of the Final BA Report, as well as the outcome of the decision making process.

Should you have any queries or require additional information please do not hesitate to contact the undersigned using the contact details provided above.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Rirhandzu Marivate', is written over a light blue horizontal line.

Ms. Rirhandzu Marivate

Postal address: PO Box 320, Stellenbosch, 7599, South Africa

Tel: 021 888 2432

Fax: 021 888 2693

E-mail: rmarivate@csir.co.za

Website: <http://www.csir.co.za/ems/specialneeds/>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Rirhandzu Marivate - NOTICE of RELEASE: DRAFT BASIC ASSESSMENT REPORT FOR AN CHICKEN LAYER FACILITY IN MASHAU-BODWE, LIMPOPO: WANGA POULTRY FARM

From: Rirhandzu Marivate
Date: 01/02/2017 10:56
Subject: NOTICE of RELEASE: DRAFT BASIC ASSESSMENT REPORT FOR AN CHICKEN LAYER FACILITY IN MASHAU-BODWE, LIMPOPO: WANGA POULTRY FARM
Bc: matzimela.A@ledet.gov.za; KgopongS@ledet.gov.za; sirwalimr@webmail.co.z...
Attachments: Rirhandzu Marivate.ncf; Letter to I&APs_ Wanga Poultry Farm.pdf

Dear Sir/ Ma'am,

Special Needs & Skills Development Programme PUBLIC PARTICIPATION PROCESS: 30 DAY COMMENTING PERIOD ON A BASIC ASSESSMENT REPORT

This e-mail serves to inform you on the release of the Draft Basic Assessment for the development of a 0.6 hectare Chicken Layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado Local Municipality, Limpopo. We would like to notify you of your opportunity to comment on the proposed chicken layer project in terms of Government Notice Regulations (GNR) 983, 984 and 985 of 4 December 2014 of the National Environmental Management Act (Act 107 of 1998) published in Government Gazette 38282 on 4 December 2014.

The Basic Assessment Report for the project is now available for a 30 day comment period from 1 February 2017 until 2 March 2017. The Electronic copy of the report is available for download from the CSIR website on the following link:

<https://www.csir.co.za/environmental-impact-assessment>

Alternatively, the report may be viewed at the **Makhado Public Library** (Cnr Erasmus Street & Kruger Street. Louis Trichardt/Makhado, 0920) for a 30 day period beginning today.

Should you wish to register as an interested and affected party (I&AP), please submit your comments on the report to the contact details below. Also include your name, contact details and an indication of any direct business, financial, personal or other interest that you may have in the applications in your submission.

**Rirhandzu Marivate, Tel: 021 888 2432; email: rmarivate@csir.co.za;
or Fax: 021 888 2693, or Mail: PO Box 320, Stellenbosch, 7599**

Furthermore, should you have received this e-mail but are no longer interested in the project, kindly let us know and you will be removed from the database.

Kindest Regards,

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Proof of e-mails sent to I&APs of the release of the DBAR

Page 1 of 1

Recipients: 24 Response Pending: 16, Undelivered: 8	
Undelivered: 8	
davidm@makhado.gov.za	Transfer Delayed
howard.hendricks@sanparks.org	Transfer Delayed
khuzwayoTV@coghsta.limpopo.gov.za	421 service unavailable
mayor@makhado.gov.za	Transfer Delayed
ntaka.calson@webmail.co.za	Transfer Failed
sakkie@makhado.gov.za	Transfer Delayed
sapa@sapoultry.co.za	Transfer Delayed
sirwalinr@webmail.co.za	550 5.1.1 <sirwalinr@webmail.co.za>: Recipient address rejected: User unknown in virtual mailbox table
Response Pending: 16	
info@golimpopo.com	Transferred
KgopongS@ledet.gov.za	Transferred
litholek@sac.limpopo.gov.za	Transferred
makoam@nra.co.za	Transferred
mandwandwe@landbank.co.za	Transferred
mashuduma@daff.gov.za	Transferred
matsimelaA@ledet.gov.za	Transferred
MMolefane@thedti.gov.za	Transferred
MohapiN@dwa.gov.za	Transferred
mokhoebirs@agric.limpopo.gov.za	Transferred
mrabothata@environment.gov.za	Transferred
ncamisile.nkabinde@drrlr.gov.za	Transferred
raphungaME@agric.limpopo.gov.za	Transferred
stephaniea@ewt.org.za	Transferred
tendanisinkie@gmail.com	Transferred
vhembe@golimpopo.com	Transferred
Attachments: User: 2, System: 2	
Send Options:	

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Comments and Responses Report

There were no comments received following the project announcement and prior release of the Draft Basic Assessment. The comments below were received following the release of the Draft Basic Assessment:

COMMENT	COMMENTATOR	DATE	RESPONSE
Considering the remediation strategies and action plan brought forth Geohydrology has no objection, however boreholes to be used for water supply should be registered with the Department of Water and Sanitation.	Matshivha L.H Scientific Officer: Geohydrology DEPARTMENT OF WATER AND SANITATION	24 April 2017 Email	Thank you for your comment, it is noted. Please note that the boreholes will be registered with DWS (this may form conditions of EA, if granted).
<ol style="list-style-type: none"> 1. The Department has noted that there is a drainage line that flows through the south eastern corner of the site. This drainage line must be protected from disturbance by the proposed development. Therefore repositioning of the structures around it is required to the areas of low significance. 2. Further to point 1 above, the Department requires that all the areas that are rated as high and medium to high in terms of ecological significance, be excluded from development. This should be demonstrated by a layout plan that is overlaid on a sensitivity map showing the exclusion of these areas, 1.'100 floodline and butter zones of the wetland and ridges. 3. It is mentioned in the report that the activity will use a borehole and 200 000 litres will be extracted per day. The Department of Water and Sanitation (DWS) must be consulted for comments and to confirm whether or not a water use license is required for the proposed activity and proof of such consultation with comments must be attached to the BAR. 4. The newspaper advert attached to the BAR describes the total area of the property to be 3 hectares whilst the project description on the application form as well as in the BAR describe the total size to be 7.8 hectares. The Department therefore requires the correct sizes of the property and development site. 5. In light of point 2 above, the application form must be amended to reflect correct sizes and correct information must be communicated during public participation 	Deputy Director: Environmental Impact Management Department of Economic Development, Environment & Tourism: Limpopo	27 February 2017 Email	<p>Thank you for your comments, each will be responded to using the corresponding number in the comments:</p> <ol style="list-style-type: none"> 1. Noted. Please see the site layout plan in Appendix A for inclusion of this consideration. 2. Please see responses above. 3. Please see comments above from Department of Water and Sanitation that were received following our request for this information. 4. Noted. The correct size of the property is 7.8 hectares and this has been corrected in the document. 5. <i>The application form reflects the correct size of the property and development site as 7.8 hectares. The public were also notified in subsequent letters</i>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

COMMENT	COMMENTATOR	DATE	RESPONSE
<p>process (PPP).</p> <p>6. On page 35 of the BAR (Air Quality Impact: increased odours resulting from chicken facility), it states that it will be ensured that “excrement, carcasses, feed and materials are appropriately and effectively contained and disposed of without detriment to the air quality of the receiving environment”. Measures to ensure appropriate and effective containment and disposal without damage to the receiving environment must be thoroughly addressed and included in the Environmental Management Programme report (EMPr).</p> <p>7. Pages 43 of the BAR as well as page 34 of the EMPr mention operations of pig production and chicken broiler facilities. Consistency is very important as this is crucial information to help with decision making. Therefore clarity is required in this regard.</p> <p>8. It is also mentioned in the BAR (Waste Management) that the solid waste during Operation which will be saw dust and chicken feces will be stored in 12 kg bags and stored on the waste storage facility on site to be sold to local farmers for use as fertilizers. The Department therefore requires information on the kind of storage facility to be used and based on the demand of fertilizers, if any. how long will the fertilizers be stored before they are sold as this may be another health hazard to the environment. This must also be related to how flies as nuisance will be dealt with</p> <p>9. The facility illustration and locality map attached to the BAR does not meet the requirements as stated on page 14 of the BAR. The illustration must include but not limited to boundary of the site, all structures with sizes including storage facility as stated above, storm water management channels and the location of all structures in relation to the stream on the south-eastern side of the property. It is required to have the storage facility lined to avoid or prevent seepage of fertilizers into groundwater. The said measures must also be indicated on the facility illustration.</p> <p>10. On page 61 of the EMPr it is mentioned that the project will be operated in such a</p>			<p><i>and e-mails (when the Draft BAR was released of the correct size of the site). With the release of the final BAR, the public will again be notified of the correct property size.</i></p> <p>6. Noted. Please see the EMPr, Page 35 for a more thorough description of these procedures.</p> <p>7. Noted, this error has been fixed.</p> <p>8. Please see section 6.15 of the EMPr on Page 70.</p> <p>9. Thank you, please see Appendices A to C for this updated information.</p> <p>10. Please see the EMPr, Section 6.13 (Page 68) for more detailed information on this.</p> <p>11. Please see Section 6.13(Page 68) of the EMPr highlighting mortality management.</p>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

COMMENT	COMMENTATOR	DATE	RESPONSE
<p>manner that odours are minimized. How will this be achieved? The manner referred to must be outlined in the BAR and EMPr. Furthermore the EMPr does not mention anything about the chemicals to be used for this activity and whether they are environmentally friendly or not. The Department requires such information to help make an informed decision.</p> <p>11. The Department also requires information on how mortalities will be managed.</p> <p>Kindly bring to the attention of the applicant the fact that this development must not commence prior to the department deciding on the application.</p>			

Note: LEDET sent a letter of the project announcement together corrections on the BID. The corrections have since been applied (see letter and email of acknowledgement below).

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Email acknowledging letter (14/07/2016)

Rirhandzu Marivate - RE: PROPOSED WANGA POULTRY FARM ON A 3 HECTARE FARM IN MASHAU-BODWE VILLAGE, MAKHADO LOCAL MUNICIPALITY

From: Rirhandzu Marivate
To: NgoashengTR@ledet.gov.za
Date: 14/07/2016 11:27
Subject: RE: PROPOSED WANGA POULTRY FARM ON A 3 HECTARE FARM IN MASHAU-BODWE VILLAGE, MAKHADO LOCAL MUNICIPALITY
Attachments: Rirhandzu Marivate.vcf

Dear Mr TR Ngoasheng,

Thank you for responding to the project.

Thank you for pointing out the errors that have appear in the released BID document. They will be corrected prior to the submittal of the application for Environmental Authorisation. They will also be address in the comments trail of the Draft BAR.

Secondly, to respond to the application. We will be submitting an application for the project when the Draft BAR is complete.

If there are any further I&APs that we would require for the project please do not hesitate to let us know. Also let us know if there is any information you require currently regarding the project.

We look forward to working with you.

Kindest Regards,

Rirhandzu Marivate
Junior Environmental Scientist
Environmental Management Services
Consulting Services
CSIR

tel: 021-888-2432

email: rmarivate@csir.co.za

Web: <http://www.csir.co.za/ems/specialneeds/>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Copies of Comments from I&APs

27. FEB. 2017 13:34

ECO DEV ENV & TOURIS



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

ENVIR. NO. 384	MENT & P. 13
CAPRICORN & VHEMBE	GOVERNMENT
2017-02-27	
P.O. BOX 2544, POLOKWANE 0700	
TEL: 015 291 1218	
LIMPOPO PROVINCE	

DEPARTMENT OF ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

Enq: Miss Mhlongo TN Tel: 015 290 7156 Fax: 015 295 5016 E-mail: MhlongoTN@ledet.gov.za Reference: 12/18/1-V167
NEAS Reference: Lim/EIA/000301/2017

CSIR Environmental Management Services
P O Box 320
STELLENBOSCH
7599

Fax no: 021 888 2693

Attention: Ms Rirhandzu Marivate

RE: PROPOSED DEVELOPMENT OF A 0.6 HECTARES CHICKEN LAYER FACILITY AT MASHAU-BODWE VILLAGE WITHIN MAKHADO LOCAL MUNICIPALITY OF VHEMBE DISTRICT

The application for environmental authorisation received on 02 February 2017 refers.

The Department has reviewed the content of the Basic Assessment Report (BAR) and has the following comments to be addressed and submitted with a BAR on or before 02 May 2017:

1. The Department has noted that there is a drainage line that flows through the south eastern corner of the site. This drainage line must be protected from disturbance by the proposed development. Therefore repositioning of the structures around it is required to the areas of low significance.
2. Further to point 1 above, the Department requires that all the areas that are rated as high and medium to high in terms of ecological significance, be excluded from development. This should be demonstrated by a layout plan that is overlaid on a sensitivity map showing the exclusion of these areas, 1:100 floodline and buffer zones of the wetland and ridges.
3. It is mentioned in the report that the activity will use a borehole and 200 000 litres will be extracted per day. The Department of Water and Sanitation (DWS) must be consulted for comments and to confirm whether or not a water use license is required for the proposed activity and proof of such consultation with comments must be attached to the BAR.
4. The newspaper advert attached to the BAR describes the total area of the property to be 3 hectares whilst the project description on the application form as well as in the BAR describe the total size to be 7.8 hectares. The Department therefore requires the correct sizes of the property and development site.
5. In light of point 2 above, the application form must be amended to reflect correct sizes and correct information must be communicated during public participation process (PPP).
6. On page 35 of the BAR (Air Quality Impact: increased odours resulting from chicken facility), it states that it will be ensured that "excrement, carcasses, feed and materials are appropriately and effectively contained and disposed of without detriment to the air quality of the receiving environment". Measures to ensure appropriate and effective containment and disposal without damage to the receiving environment

Corner Suid & Dorp Street, Polokwane, 0899, Private Bag X 9484, Polokwane, 0700
(Switchboard) Tel: +2715 290 7000 Website: www.ledet.gov.za

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APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

27. FEB. 2017 13:36

ECO DEV ENV & TOURIS

NO. 384 P. 2

Department of Economic Development, Environment and Tourism

Ref. No. 12/1/9/1-V167

- must be thoroughly addressed and included in the Environmental Management Programme report (EMPr).
7. Pages 43 of the BAR as well as page 34 of the EMPr mention operations of pig production and chicken broiler facilities. Consistency is very important as this is crucial information to help with decision making. Therefore clarity is required in this regard.
 8. It is also mentioned in the BAR (Waste Management) that the solid waste during operation which will be saw dust and chicken feces will be stored in 12 kg bags and stored on the waste storage facility on site to be sold to local farmers for use as fertilizers. The Department therefore requires information on the kind of storage facility to be used and based on the demand of fertilizers, if any, how long will the fertilizers be stored before they are sold as this may be another health hazard to the environment. This must also be related to how flies as nuisance will be dealt with
 9. The facility illustration and locality map attached to the BAR does not meet the requirements as stated on page 14 of the BAR. The illustration must include but not limited to boundary of the site, all structures with sizes including storage facility as stated above, storm water management channels and the location of all structures in relation to the stream on the south-eastern side of the property. It is required to have the storage facility lined to avoid or prevent seepage of fertilizers into groundwater. The said measures must also be indicated on the facility illustration.
 10. On page 61 of the EMPr it is mentioned that the project will be operated in such a manner that odours are minimized. How will this be achieved? The manner referred to must be outlined in the BAR and EMPr. Furthermore the EMPr does not mention anything about the chemicals to be used for this activity and whether they are environmentally friendly or not. The Department requires such information to help make an informed decision.
 11. The Department also requires information on how mortalities will be managed.

Kindly bring to the attention of the applicant the fact that this development must not commence prior to the department deciding on the application.

Please do not hesitate to contact the Department should there be any other queries in this respect.

Yours faithfully


DEPUTY DIRECTOR
ENVIRONMENTAL IMPACT MANAGEMENT

DATE: 27/2/17

DEPARTMENT OF ECONOMIC DEVELOPMENT ENVIRONMENT & TOURISM ENVIRONMENTAL IMPACT MANAGEMENT CAPRICORN & VHEMBE
2017 -02- 27
P.O. BOX 25454, POLOKWANE 0700 TEL: 018 291 3215 LIMPOPO PROVINCE

Cc: Wanga Poultry Farm (Pty) Ltd

Attention: Calson Nembanzheni

Fax: ntaka.calson@webmail.co.za

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Email from the Department of Water and Sanitation (Limpopo)

DEPARTMENT OF WATER AND SANITATION

INTERNAL MEMORANDUM

THRO: control technician

: Mahlo M.J

FROM: scientific officer geohydrology

: Matshivha L.H

DATE: 24 April 2017

**DRAFT BASIC ASSESSMENT FOR THE PROPOSED
DEVELOPMENT OF A 0.6 HECTARE CHICKEN LAYER
FACILITY ON A 7.8 HECTARE FARM IN MASHAUBODWE VILLAGE, MAKHADO DISTRICT,
and LIMPOPO.**

Considering the remediation strategies and action plan brought forth Geohydrology has no objection, however boreholes to be used for water supply should be registered with the Department of Water and Sanitation.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

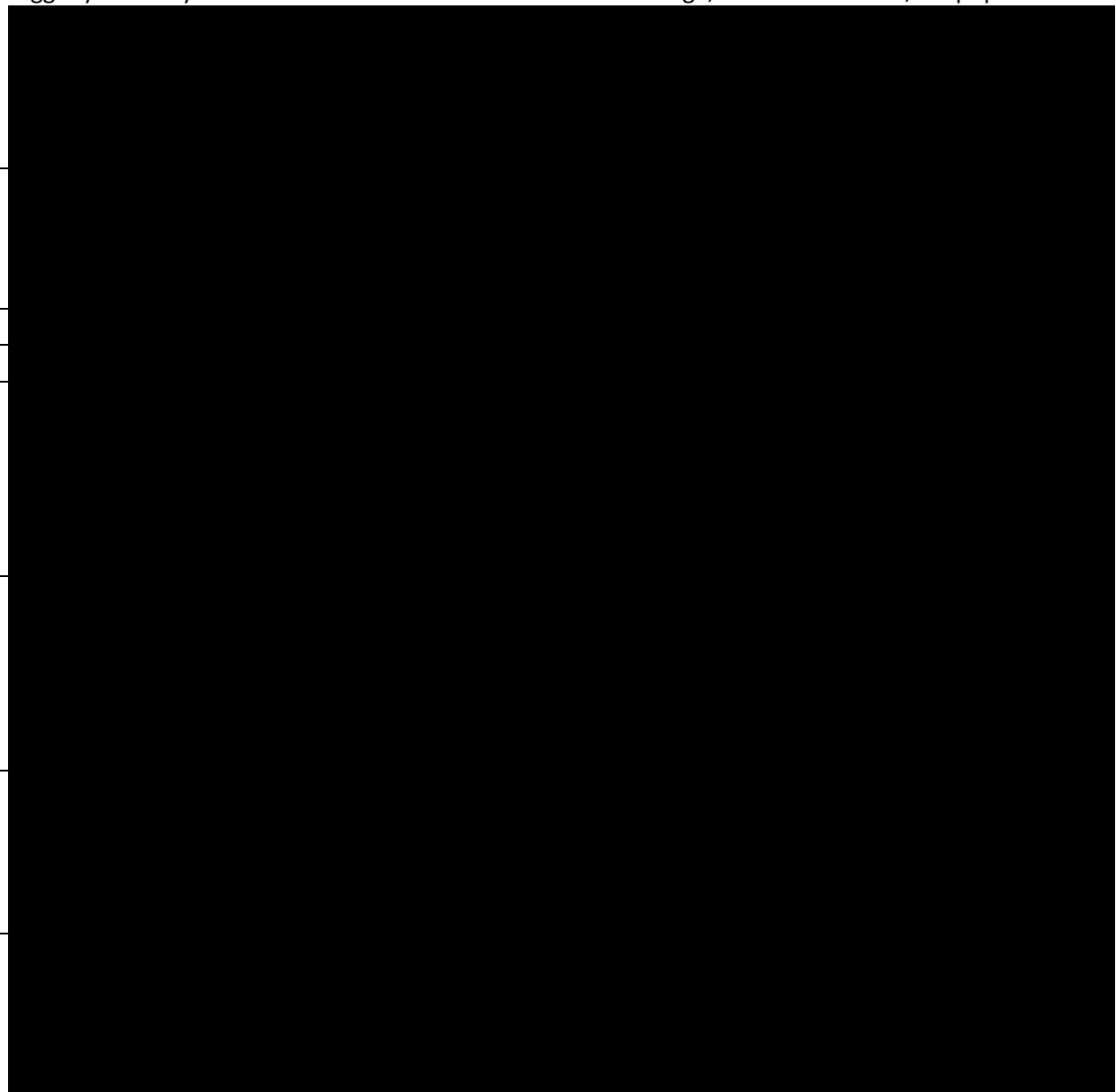
Copy of I&APs Register

Company/organization	Name	Position	Physical Address	Phone	Postal	Cell	Email
PROVINCIAL & MUNICIPALITY							
Limpopo Department of Economic Development, Environment & Tourism	Mr Abel Matsimela	Senior Manager (MEC)					
Limpopo Department of Economic Development , Environment & Tourism	Mr Solly Kgopong	Head of Department					
Limpopo Department of Economic Development, Environment & Tourism	Ms NM Mdau						
Limpopo Department of Health	Mr Siwali	Vhembe District Executive Manager					
Department of Agriculture: Limpopo Province	Mr Terries Salani Ndove	Head of Department					
Department of Agriculture: Limpopo Province	Ms M.E. Raphunga	District Director					

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Limpopo Department of Cooperative Governance, Human Settlements & Traditional Affairs	Ms SH Mabuda	Vhembe District Offices
Limpopo Department of Cooperative Governance, Human Settlements & Traditional Affairs	Mr TV Khuzwayo	Traditional Houses Manager
Vhembe District Municipality	SE Makhomisan e	Community Services
Vhembe District Municipality	MP Themba	Planning
Makhado Local Municipality	David Mutavhatsindi	Councillor
Makhado Local Municipality	Sakkie Mutshinyalie	Municipal Manager



LANDOWNERS & NEIGHBOURS

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Wanga Poultry Farm (Pty) Ltd	Ntaka Calson Nembanzheni	Applicant	
Mashau Tribal Authority	T.R.V. Mashau	Chief	
NATIONAL			
National Department of Environmental Affairs	Mmatlala Rabothata		
National Department of Rural Development and Land Reform	Bonginkosi Zulu		

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

National Department of Agriculture, Forestry and Fisheries	Mashudu Marubini	
National Department of Water Affairs	Ms Ndileka K Mohapi	
National Department of Trade and Industry	Maoto Molefane	
OTHER		
South African National Parks (SANParks)	Dr. Howard Hendriks	
South African Heritage Resources Agency (SAHRA)	Marie South	
Limpopo Provincial Heritage Resrouce Authority (LIHRA)		
South African National Roads Agency	Ms Mpati Makoa	
Endangered Wildlife Trust (EWT)	Stephanie Aken	
AgriLand	Anneliza Collett	
Grasslands Society of South Africa	Feyni Du Toit	

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Limpopo Tourism Agency		Head Offices	
Vhembe Tourism & Parks Resource Centre			
Limpopo Economic Development Agency	Mr Humphrey Maphutha	Executive Manager: Enterprise Development and Finance Division	
Limpopo Economic Development Agency		Makhado District	
South African Poultry Association	Kevin Lovell	CEO	
Land and Agricultural Development Bank	Muzi Ndwandwe	Relationship Manager	

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX F: Environmental Management Programme

**FOR THE PROPOSED DEVELOPMENT OF A
0.6 HECTARE CHICKEN LAYER FACILITY
ON A 7.8 HECTARE FARM IN MASHAU-
BODWE VILLAGE, MAKHADO DISTRICT,
LIMPOPO.**



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

contents

1. INTRODUCTION	34
1.1. PROJECT DESCRIPTION	34
1.2. AUTHORS OF THE DRAFT EMPr.....	35
2. THE APPROACH TO THE EMPr.....	35
2.1. COMPLIANCE WITH RELEVANT LEGISLATION.....	35
2.2. CONTENT OF EMPr	39
2.3. AIM OF ENVIRONMENTAL MANAGEMENT	39
3. ROLES AND RESPONSIBILITIES	39
3.1. PROJECT DEVELOPER.....	40
3.2. ENVIRONMENTAL CONTROL OFFICER	40
3.3. CONSTRUCTION MANAGER (Lead Contractor or Engineering Consultant).....	41
3.4. OPERATIONS MANAGER	42
4. MANAGEMENT ACTIONS FOR THE PLANNING AND DESIGN PHASE	43
5. MANAGEMENT PLAN FOR CONSTRUCTION PHASE	47
6. MANAGEMENT PLAN OF OPERATIONAL PHASE	63
7. MANAGEMENT PLAN FOR THE DECOMMISSIONING PHASE	73
8. SITE REHABILITATION	83
9. CONCLUSION	83

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

1. INTRODUCTION

This Environmental Management Programme (EMPr) is prepared as part of the requirements of the Environmental Impact Assessment (EIA) Regulations (2014, as amended), promulgated under the National Environmental Management Act (NEMA)(Act 107 of 1998, as amended). The Draft EMPr is to be submitted to the Limpopo Economic Development, Environment and Tourism (LEDET) as part of the Application for Environmental Authorisation for the proposed Construction of a Chicken Egg-layer Facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado Local Municipality, Limpopo. The project applicant is Wanga Poultry Farm (Pty) Ltd.

The Basic Assessment was conducted in order to assess the potential impacts the development might have on the environment. These impacts were assessed in detail and as far as possible, mitigation recommendations are presented within the EMPr in order to ensure informed decision-making and improved sustainable development. These recommendations also include specific management measures applicable to individual natural resources and infrastructure activities as well as general management measures which apply to the proposed infrastructure construction area as a whole.

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

1.1. PROJECT DESCRIPTION

Wanga Poultry Farm (Pty) Ltd is proposing to establish a start-up enterprise comprising of a chicken layer facility in Mashau-Bodwe, Limpopo. The start-up enterprise plans to build a 0.6 ha chicken layer facility on a 7.8 ha farm. The start-up plans to produce eggs in commercial quantities of 120 000 eggs per day. The agricultural development triggers listed activities in terms of GNR 983 and 985 of December 2014, promulgated under the National Environmental Management Act (Act 107 of 1998). The development would assist Wanga Poultry to farm egg –laying chickens commercially in support of his livelihood. Wanga Poultry obtained funding from the Land Bank. For the proposed development to succeed, a number of criteria need to be met. These criteria include obtaining and environmental authorisation.

A detailed description of the proposed project is included in Section B of the Final BAR. A description of the affected environment is provided in Section C of the Final BAR. Refer to Appendix A of this EMPr for the proposed layout of the project.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

1.2. AUTHORS OF THE DRAFT EMPr

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

Table 1: EIA Team

Environmental Assessment Practitioner			
Name	Organisation	Role	Qualification/Expertise
Rirhandzu Marivate	CSIR	Project Manager	BSc (Honours) Ecology, Environment and Conservation.
Minnelise Levendal	CSIR	Project Leader	MSc Environmental Science
Paul Lochner	CSIR	Reviewer	BSc Civil Engineering MPhil Environmental Science
Specialist Team			
Name	Organisation	Role/Specialist Study	Qualification/Expertise
Susan Abell	NSS	Vegetation and General Ecology Specialist	MSc Resource Conservation Biology (Pr Nat. Sci.- Ecology & Environmental Science)
Caroline Lotter	NSS	Faunal Specialist	PhD Zoology (Pr. Nat. Sci- Zoology)

2. THE APPROACH TO THE EMPr

2.1. COMPLIANCE WITH RELEVANT LEGISLATION

In terms of legal requirement, a crucial objective of the EMPr is to satisfy the requirements of National Environmental Management Act (NEMA) EIA Regulations published in GNR 983, 984 and 985 on the 4 December 2014 Government Gazette Number 38282. 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 Draft EMPr is presented in Table 2.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

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 is it included in this EMPr?
<p>2) The environmental management programme must contain-</p> <p>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:</p> <p>(i) planning and design;</p> <p>(ii) pre-construction and construction activities;</p> <p>(iii) the operation or undertaking of the activity in question;</p> <p>(iv) the rehabilitation of the environment; and</p> <p>(v) closure, if applicable.</p>	<p>Section 4 of 7 and the columns detailing the impact description, mitigation and management objectives, and mitigation and management actions.</p>
<p>b) details of-</p> <p>(i) the person who prepared the environmental management programme; and</p> <p>(ii) the expertise of that person to prepare an environmental management programme;</p>	<p>Appendices I of the Draft BA Report to which this EMPr is attached.</p>
<p>c) a detailed description of the aspects of the activity that are covered by the environmental management programme;</p>	<p>Section 1</p>
<p>d) information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);</p>	<p>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.</p>
<p>e) information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance;</p>	<p>The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.</p>
<p>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 sustainable development; and</p>	<p>Sections 4 to 7 of this EMPr, as applicable to the post-construction, rehabilitation phase and the decommissioning phase.</p>
<p>g) a description of the manner in which it intends to-</p>	<p>The columns detailing the mitigation and</p>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

<p>(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.</p>	<p>management objectives, mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.</p>
<p>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.</p>	<p>The columns detailing the mitigation and management actions, and the monitoring methodology, frequency and responsibility in Sections 4 to 7 of this EMPr.</p>
<p>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.</p>	<p>Not applicable at this stage.</p>
<p>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.</p>	<p>Not applicable at this stage.</p>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

<p>7) The holder and any person issued with an environmental authorisation-</p> <ul style="list-style-type: none">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<ul style="list-style-type: none">(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 to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; andf) 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.	<p>Throughout the EMPr</p>
<p>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.</p>	<p>Section 3 details the responsibility of the Project Applicant.</p>

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

2.2. CONTENT OF EMPr

A typical EMP takes the planning and design, construction, operational and decommissioning phases of a project into account. The EMP is compiled as part of the Basic Assessment (BA) process and is an annexure to the project report.

The EMPr is based mainly on the finding and recommendations of the BA process. The EMPr, is however considered the live document and must be updated with additional information or actions during the lifetime of the project if and when needed.

The EMPr follows an approach of identifying an over-arching goal and 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 the goal and associated objectives, actions, responsibilities, monitoring requirements and targets. 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 enhances, 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. AIM OF ENVIRONMENTAL MANAGEMENT

The overall goal for environmental management for Wangá Poultry proposed Chicken Broiler Facility project is to construct and operate in a manner that

- 1) Minimises the ecological footprint of the project on the local environment
- 2) Facilitated harmonious co-existence between the project and other land uses in the area; and
- 3) Contributes to the environmental baseline and understanding of environmental impacts of chicken egg-layer facilities in the South African Context.

3. ROLES AND RESPONSIBILITIES

For the purpose of the EMP, the generic roles that need to be defined are those of the:

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

- Project Developer
- Environmental Control Officer
- Operations Manager
- Construction Manager

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.

3.1. PROJECT DEVELOPER

The Project Developer (Wanga Poultry) is the owner of the project and as such is responsible for ensuring the conditions of the Environmental Authorisation issues in terms of NEMA (should the project receive EA) are fully satisfied, as well as ensuring that any other necessary permits or licences are obtained and complied with. It is expected that the project Developer will appoint the Environmental Control Officer (ECO) and the Operations Manager.

Wanga Poultry will also be responsible for commissioning the compilation of a Restoration Plan when the production ceases.

3.2. ENVIRONMENTAL CONTROL OFFICER

The ECO will be responsible for overseeing the implementation of the EMPr during the Construction of all the Phases and Operations of the chicken egg-layer facilities, including for the monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessarily.

During the Construction Phase, the ECO will be responsible for the following:

- Meeting the site with the Farm Manager prior to the commencement of the construction to confirm the procedure and designated activity zones;
- Monitoring of site activities during construction to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist that is to be prepared by the ECO at the start of the construction phase;
- Preparation of the monitoring report as needed; and
- Conducting an environmental inspection on completion of the Construction Phase

During Operations the ECO will be responsible for:

- Overseeing the implementation of the EMPr for the operation phase;
- Ensuring the necessary environmental monitoring takes place as specified in the EMPr;

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

- Update the EMPr and ensure that records are kept of all monitoring activities and results.

During Rehabilitation and Restoration Phase, the ECO will be responsible for:

- Ensuring the activities outlined in the Restoration Plan is undertaken.

At the time of preparing this draft EMPr, the ECO appointment is still to be made by the Community Trust. The appointment is dependent upon the project proceedings to the Construction phase.

3.3. 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 upgraded Storage Terminal.
- 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.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

3.4. OPERATIONS MANAGER

The Operations Manager will be responsible for the following:

- Operation of the Chicken Egg-layer Facilities.
- Required maintenance of the facilities.
- Overall compliance with the EMPr and Environmental Authorisation.

Ensuring that the specified environmental monitoring programmes during operations are undertaken effectively and that the findings are analysed and applied.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

4. MANAGEMENT ACTIONS FOR THE PLANNING AND DESIGN PHASE

The aim of managing tasks associated with planning and design phase of the chicken egg-layer facility is to ensure that potential environmental impacts identified during the Basic Assessment (BA) Process are effectively used to inform project design. This promotes the use of pre-emptive measures that serve to minimise the potential environmental impacts that may otherwise require mitigation at a later stage in the process. The potential impacts resulting from development of the preferred sites during planning and design phase of the activity are provided below.

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. Ensure compliance with relevant Environmental Specifications for the control and removal of alien invasive plant species. 4.1.2. Appoint a specialist or contact relevant authorities to seek guidance on the removal of the alien vegetation on site.	Appoint a suitable specialist/ Contractor or contact the relevant authorities to seek guidance on the removal of the planted alien invasive species.	Once-off during the design phase.	Project Developer
B. Indigenous Vegetation Management					
4.2. Loss of Indigenous and Conservation Important Species from clearing of vegetation and increase in vehicle and human activity.	Ensure that the planted indigenous species are safely removed and relocated. Stockpile topsoil (preferably 1-1.5m in height) to maintain viability of the indigenous seed bank for subsequent re-vegetation of any disturbed areas.	4.2.1. Obtain the relevant pre-requisite permits from the relevant Authorities prior to the removal of the indigenous species. Once these permits are obtained, search and rescue must be undertaken.	Appoint a suitable Search and Rescue Specialist/ Contractor to undertake translocation.	Once-off prior to construction.	Contractor or Specialist
4.3. Loss of habitat through clearing	Minimise the disturbance footprint and spill over / edge effects on surrounding habitat.	4.3.1. Restrict all habitat loss and disturbances from construction activities to within the proposed and agreed upon site layout.	Revise the planned layout of the facility and all associated infrastructure to avoid all High sensitive areas as far as possible. Clearly demarcate or fence in the	Once-off during the design phase.	Contractor or Specialist

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			<p>construction site. Specimens that are situated in the construction footprint, according to the advice of an appropriate specialist.</p> <p>Identify and mark large trees both on the ground and digitally to facilitate the incorporation of as many large trees into the final project layout as possible. Wherever possible endeavour to conserve large trees in situ.</p>		
4.4. Mortality of fauna in surrounding areas	To reduce mortality rates and continued displacement of fauna in surrounding areas	<p>4.4.1. Adhere to law and best practice guidelines regarding the displacement and relocation of CI fauna</p> <p>4.4.2. Appropriately deal with fauna encountered on site.</p> <p>4.4.3. Time construction activities to minimise faunal mortality</p> <p>4.4.4. Limit indiscriminate killing, persecution or hunting of fauna.</p>	<p>Prior to construction commission a suitably qualified ecologist to remove and relocate species to suitable surrounding habitats. E.g. All termitaria within the project footprint should be carefully searched for Striped Harlequin Snakes. Grass should also be searched for grass lizards and these searches should continue into the night for hedgehogs.</p> <p>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.</p> <p>Ensure policies and procedures are in place regarding the handling and removal of fauna encountered on site.</p> <p>Ensure that staff are trained and properly equipped to safely handle fauna (particularly snakes and bullfrogs) or</p>	Weekly	Project Developer and Specialist

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			<p>that the services of a trained professional are readily available on call.</p> <p>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.</p> <p>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.</p> <p>Prohibit the introduction of domestic animals such as dogs and cats.</p> <p>Educate staff on prohibited actions involving the utilisation of wildlife (i.e. poaching / harvesting) through training and notices.</p> <p>Routinely walk fence lines to remove snares.</p>		
C. Design of Chicken Egg-Layer Facility					
4.5. Impact on and disturbance to existing infrastructure (roads, stormwater pipelines)	Reduce unnecessary impacts on existing service infrastructure surrounding the proposed site and avoid potential planning impacts within the area.	4.5.1. Consult with the relevant municipal departments during the detailed engineering phase to discuss the impact of the proposed project on existing	Ensure that this is taken into consideration during the design phase.	Once-off during the design phase.	Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
during construction.		service infrastructure.			
		4.5.2. Ensure that all Building Plans and associated documents have been approved by Municipality prior to construction.			
		4.5.3. Assess the risks of excavation work by reviewing cable and pipe routings.			
4.6. Risks of accidents and hazards during the construction and operational phases.	<p>Reduce potential accidents and hazards during the construction and operational phases.</p> <p>The design must comply with all applicable legislative requirements, specifically as prescribed in the Occupational Health and Safety Act (Act 85 of 1993) under the Construction Regulations.</p>	4.6.1. Compile an Emergency Response Action Plan (ERAP) prior to the commissioning of the proposed project.	Ensure that the recommendations from the Emergency Response Action Plan (ERAP) are taken into consideration during the design phase.	Once-off during the design phase.	Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
4.7. Environmental Contamination	Reduce any environmental contamination	4.7.1. 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 that the chicken houses and associated waste disposal facility are designed and lined with impermeable substances (clay-type soils, geosynthetic plastic, or concrete) in accordance with advice from suitably qualified agricultural experts and international best practice norms.		

5. MANAGEMENT PLAN FOR CONSTRUCTION PHASE

The overall goal of the construction phase is to undertake all the relevant construction activities in a way that ensures proper management of environmental aspects and impacts; and to minimise disruptions to other land use activities in the area, traffic and farming activities that occur elsewhere in and around the farm. The potential impacts resulting from development of the preferred site during the construction phase of the activity are provided below.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Alien Vegetation Management					
5.1. Removal of alien invasive vegetation from the proposed	Ensure the correct removal of alien invasive vegetation from the proposed project area and	5.1.1. The planted alien invasive vegetation should be removed immediately (in	Monitor the removal of the alien invasive vegetation.	During the removal process	ECO

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
project area.	prevent the establishment and spread of alien invasive plants due to the project activities.	line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a licenced waste disposal facility.			
5.2. Increased Risk of Alien Plant Invasion	Reduce the establishment and spread of alien invasive plants due to the project activities.	5.2.1. Ensure compliance with relevant Environmental Specifications for the control and removal of these species.	Monitor the presence of alien invasive plants during the construction phase.	Weekly	ECO
		5.2.2. All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods.			
B. Indigenous Vegetation Management					
5.3. Loss of Planted Indigenous Species	Ensure that the planted indigenous species are safely removed and relocated.	5.3.1. Search and rescue must be undertaken and, where possible, these species must be relocated to a suitable nursery or relocated to an alternate location within the site.	Appoint a suitable Search and Rescue Specialist/ Contractor to undertake translocation.	Once-off prior to construction.	Contractor or Specialist
5.4. Loss of CI or medicinally important plant species	To minimise loss of CI or medicinally important plant species in accordance with law and best practice and encourage rehabilitation	5.4.1. Adhere to law and best practice guidelines regarding the displacement of CI and medicinally important floral species.	Guidance from a suitably qualified vegetation specialist or horticulturist regarding the collection, propagation/storage and transplantation of plants is advised.	During construction.	Contractor or Specialist
5.5. Mortality of fauna in surrounding areas	To reduce mortality rates and continued displacement of fauna in surrounding areas	5.5.1. Adhere to law and best practice guidelines regarding the displacement and relocation of CI fauna	Prior to construction commission a suitably qualified ecologist to remove and relocate species to suitable surrounding habitats. E.g. All termitaria within the project footprint should be	Weekly	Project Developer and Specialist
		5.5.2. Appropriately deal with fauna encountered on site.			

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		<p>5.5.3. Time construction activities to minimise faunal mortality</p> <p>5.5.4. Limit indiscriminate killing, persecution or hunting of fauna.</p>	<p>carefully searched for Striped Harlequin Snakes. Grass should also be searched for grass lizards and these searches should continue into the night for hedgehogs.</p> <p>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.</p> <p>Ensure policies and procedures are in place regarding the handling and removal of fauna encountered on site.</p> <p>Ensure that staff are trained and properly equipped to safely handle fauna (particularly snakes and bullfrogs) or that the services of a trained professional are readily available on call.</p> <p>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.</p> <p>Check open trenches for trapped</p>		

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			<p>animals (e.g. bullfrogs, hedgehogs and snakes), which should be carefully caught and relocated according to the specifications of a relevant specialist.</p> <p>Prohibit the introduction of domestic animals such as dogs and cats.</p> <p>Educate staff on prohibited actions involving the utilisation of wildlife (i.e. poaching / harvesting) through training and notices.</p> <p>Routinely walk fence lines to remove snares.</p>		
5.6. Sensory disturbance of faunal communities	Minimise sensory disturbance surrounding faunal communities	5.6.1. 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
5.7. Sensory disturbance of faunal communities	Minimise sensory disturbance surrounding faunal communities	5.7.1. 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 such as korhaans and Secretarybirds.	Daily	Project Developer EHS Manager
5.8. Sensory disturbance of faunal communities	Minimise sensory disturbance surrounding faunal communities	5.8.1. 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					
5.9. Potential noise impact from piling operations during the construction phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that the piling noise is mitigated.	5.9.1. All operations should be conducted during daytime only (i.e. 06:00 – 22:00, as defined in South African National Standards (SANS)	Construction times to be monitored and managed (as well as included in the tender contract).	Daily	Contractor and EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		10103).			
D. Visual Impacts					
5.10. Potential visual intrusion of construction/demolition activities on the views of sensitive visual receptors.	Prevent unnecessary visual clutter from focusing attention of surrounding visual receptors on the proposed development.	5.10.1. The Contractor should maintain good housekeeping on site to avoid litter and minimise waste. Ensure that rubble and litter are appropriately stored and regularly removed from site to a licenced waste disposal facility. 5.10.2. Dust generation must be kept at a minimum. 5.10.3. Night lighting of construction sites must be minimised within requirements of safety and efficiency.	Rubble/litter/waste removal and disposal to be monitored throughout construction. Complaints about night lights should be investigated and documented in a register.	Weekly or bi-weekly	Contractor and ECO
E. Traffic Impacts					
5.11. Impact of construction vehicles on the Maydon Wharf 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.	5.11.1. 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					
5.12. Noise generation from demolition and construction work (e.g. grinding and use of angle grinders), as well as from the removal of waste material	Reduce the potential noise impacts on the construction workers.	5.12.1. Construction personnel must wear proper hearing protection, which should be specified as part of the Construction Phase Risk Assessment carried out by the Contractor. 5.12.2. The Contractor must ensure	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 requirements of the Contract.	Throughout the construction phase (i.e. weekly).	ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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(e.g. crane and truck engines).		that all construction personnel are provided with adequate Personal Protective Equipment (PPE) for use where appropriate.			
5.13. 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.	5.13.1. 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
5.14. Heavy traffic, congestion and potential for collisions during the construction phase.	Prevention of injuries, fatalities, and damage to equipment and vehicles during the construction phase.	5.14.1. During the construction phase, suitable parking areas should be created and designated for construction trucks and vehicles.	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the construction phase.	Project Developer, ECO and Contractor
		5.14.2. A construction supervisor should be appointed to co-ordinate construction traffic during the construction phase.			
		5.14.3. Road barricading should be undertaken where required and road safety signs should be adequately installed at strategic points within the construction site.			
		5.14.4. Road worthy vehicles (i.e. stop and indicator lights) and only licenced vehicle drivers should be used. Vehicle maintenance and driver competency should be monitored. The Contractors	Perform random checks of driver licenses and conduct random visual inspections of construction vehicles for roadworthiness.	Random visual inspection of vehicles weekly by the Contractor.	Project Developer and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		must ensure that construction vehicles are roadworthy, properly serviced and maintained.			
5.15.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.	<p>5.15.1. 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.</p> <p>5.15.2. The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate.</p> <p>5.15.3. The Contractor must prescribe, to construction personnel.</p> <p>5.15.4. A Construction Site Manager or Safety Supervisor should be appointed, in conjunction with the engineering project manager, to monitor all safety aspects during the construction phase.</p> <p>5.15.5. Ensure that roads are not closed during construction, which may restrict access for emergency services.</p>	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the construction phase (i.e. weekly).	Project Developer , ECO and Contractor
5.16.Pollution of water and ground as a result of spillages, generation of building rubble and waste scrap material.	Prevent unnecessary pollution impacts on the surrounding environment.	5.16.1. The construction site should be cleaned regularly and all construction waste (i.e. concrete, steel, rubble, packaging material etc.) must be removed from site and disposed at a licenced	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the construction phase.	Project Developer, ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		<p>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.</p> <p>5.16.2. 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.</p>			
G. Heritage Resources (Archaeology and Palaeontology)					
5.17. Impact on Archaeology and Palaeontology	Prevent damage and destruction to buildings, artefacts and materials of heritage significance.	5.17.1. 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
		5.17.2. 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 Mpumalanga Heritage/SAHRA (or the	Monitor excavations and construction activities for archaeological and palaeontological materials and report the finds accordingly. Mpumalanga Heritage /SAHRA and the identified palaeontologist/archaeologist if any heritage features are uncovered.	As required/necessary during construction.	Contractor and ECO

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		South 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					
5.18. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during construction.	5.18.1. Water conservation to be practiced in line with Energy Saving Policies as follows: <ul style="list-style-type: none"> • 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
		5.18.2. Carry out environmental awareness training with a discussion on water usage and conservation.	Conduct training for all construction personnel.	<ul style="list-style-type: none"> • Once-off during construction and ensure that all new staff are inducted. 	EHS Manager, ECO and Contractor
I. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
5.19. Potential spillage of effluent (from portable sanitation facilities for construction personnel).	Reduce the spillage of domestic effluent and the impact thereof on the environment.	5.19.1. 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

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		5.19.2. 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
		5.19.3. Carry out environmental awareness training to ensure that all personnel on-site are aware of environmental requirements and only make use of the provided facilities for sanitation purposes.	Conduct training for all construction personnel.	<ul style="list-style-type: none"> Once-off during construction and ensure that all new staff are inducted. 	EHS Manager, ECO and Contractor
		5.19.4. Ensure that sufficient toilet facilities are provided on site (one facility for every 10 persons working on the site).	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO
		5.19.5. 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
		5.19.6. Ensure that the toilet/sanitation facilities are regularly serviced and emptied.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO
		5.19.7. Ensure that the site camp and toilet/sanitation facilities are placed outside areas susceptible to flooding and beyond 32 m of the estuary.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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5.20. Contamination of soil, the marine environment 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.	5.20.1. If any concrete mixing takes place on site, this must be carried out on an impermeable surface (such as on boards or plastic sheeting and/or within a bunded area with an impermeable surface).	Monitor the handling and storage of sand, stone and cement as instructed.	Daily	Project Developer, Contractor and EHS Manager
		5.20.2. 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.			
		5.20.3. Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains.			
		5.20.4. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted.			
		5.20.5. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility.			
		5.20.6. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. Sand and aggregates containing cement must be			

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		<p>kept damp to prevent the generation of dust.</p> <p>5.20.7. 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.</p>			
J. Waste Water Management					
5.21. 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.	5.21.1. 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
		5.21.2. Ensure that adequate containment structures are provided for the storage of dangerous goods and hazardous materials on site. Appropriate bund areas must be provided for the storage of these materials. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground and stormwater system.	Monitor the bunding and containment structures.	Weekly	EHS Manager
K. Stormwater Management					
5.22. Pollution of the surrounding	Reduce the contamination of stormwater.	5.22.1. The appointed Contractor should compile a Method	Compile Method Statement	Once off (and thereafter updated as required).	Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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environment as a result of contamination of stormwater. Contamination could result from chemicals, oils, fuels, sewage, solid waste, litter etc.		Statement for Stormwater Management during the construction phase.			
		5.22.2. 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
		5.22.3. 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					
5.23. 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.	5.23.1. 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
		5.23.2. 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) must be adhered to.			
		5.23.3. Ensure that general waste and hazardous waste are removed from the site on a	Monitor via site audits and record non-compliance and incidents. EHS Manager to monitor and audit	Monthly	EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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		regular basis and disposed of at an appropriate, licenced waste disposal facility by an approved waste management Contractor. Waste disposal slips or waybills should be kept on file for auditing purposes as proof of disposal.	disposal slips.		
		5.23.4. 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.	<ul style="list-style-type: none"> Once-off during construction and ensure that all new staff are inducted. 	EHS Manager, ECO and Contractor
		5.23.5. 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
		5.23.6. No solid waste may be burned or buried on site.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager
		5.23.7. Segregation of hazardous waste from general waste to be in place.	On-site inspection of waste segregation.	Weekly	EHS Manager
M. Air Quality Management					
5.24. Air Quality Impact: Emissions from construction vehicles and generation of dust as a result of earthworks, demolition, as well as the delivery and	Reduce dust emissions during construction activities.	5.24.1. 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.	<ul style="list-style-type: none"> Monitor dust suppression mechanisms and record non-compliances. Maintain an incidents/complaints register, in which any complaints from the public must be logged. The date, time, nature of complaint, name of complainant and corrective 	<ul style="list-style-type: none"> Weekly During complaints/incidents 	EHS Manager, ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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mixing of construction materials.			actions must be logged for all complaints. Complaints must be investigated and, if appropriate, acted upon.		
		5.24.2. Implement traffic control measures on the construction site to limit vehicle-entrained dust from unpaved roads. Ensure that construction vehicles travelling on unpaved roads do not exceed a speed limit of 40 km/hour.	Monitor traffic control measures and report non-compliances.	Weekly	EHS Manager and Contractor
N. Socio-Economic Management					
5.25. Employment creation and skills development opportunities during the construction phase.	Maximise local employment and local business opportunities to promote and improve the local economy.	5.25.1. 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
		5.25.2. Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained.			
		5.25.3. 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.			
		5.25.4. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.			

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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O. Environmental Awareness and Site Camp Establishment					
5.26. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	5.26.1. 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 energy conservation practices as part of the environmental awareness training programme.	<ul style="list-style-type: none"> Contractor to monitor energy usage via site investigations. Conduct training for all construction personnel. 	<ul style="list-style-type: none"> Monthly Once off training and ensure that all new staff are inducted. 	<ul style="list-style-type: none"> Contractor EHS Manager, ECO and Contractor
5.27. Inappropriate behaviour of civil contractors and sub-contractors during the construction phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that contractors are aware of the requirements of the EMPr.	5.27.1. Designate smoking areas where the fire hazard could be regarded as insignificant.	Adhoc checks to ensure workers are smoking only in designated areas.	Daily	Contractor and EHS Manager
		5.27.2. Educate workers on the dangers of open and/or unattended fires.	Ensure fire safety requirements are well understood and respected by workers (by providing basic fire safety training).	On-going	Contractor and EHS Manager
		5.27.3. 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 construction phase.			
		5.27.4. Fire-fighting equipment must be made available at various appropriate locations on the construction site.			
5.28. Inappropriate planning of site camp establishment.	Ensure that environmental issues are taken into consideration in the planning for site establishment.	5.28.1. Ensure that the site establishment is designed and carried out in line with the requirements of relevant specifications and the landowner (TNPA).	Monitor compliance and record non-compliance and incidents.	Before construction	EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

General Recommendations:

Implementation of a construction phase Environmental Management Programme

A construction phase Environmental Management Programme should be compiled and implemented, such that it clearly addresses all the above mentioned activities, as well as appropriate locations for construction camps, vehicle storage and parking areas, ablution facilities and waste management, such that these do not impact on sensitive or otherwise important terrestrial or wetland areas.

6. MANAGEMENT PLAN OF OPERATIONAL PHASE

The objective for managing the operational phase of the chicken egg-layer facility project is to ensure that the daily operations do not have unforeseen impacts on the environment; to ensure that all the potential impacts are monitored and that the necessary corrective action are undertaken in a timeous manner. The potential impacts resulting from development of the potential sites during the operational phase of the activity are provided below.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Alien Vegetation Management					
6.1. 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.	6.1.1. 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.	During the removal process.	EHS Manager
B. Noise Impacts					
6.2. 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.	6.2.1. All drivers of the vehicles should receive training regarding the use of air brakes.	Training of drivers that are contracted.	During induction of drivers to site rules.	Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
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C. Visual Impacts					
6.3. Potential impact of night lighting of the development on the nightscape of the surrounding landscape.	Prevent night lights from impacting on surrounding visual receptors by minimizing glare and light spill.	6.3.1. Outside and security lights must use light fixtures that shield the light and focus illumination onto specific areas as required. 6.3.2. Elevated lights should be avoided, or carefully shielded to minimise glare.	Complaints referring to lighting at night should be documented, investigated and resolved.	When complaints are received.	Project Developer
D. Traffic Impacts					
6.4. Impact of extra parked vehicles during the operational phase.	Prevent unnecessary or excessive heavy vehicles.	6.4.1. 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 development.	Project Developer
E. Safety, Health and Environment					
6.5. Pollution of water and the ground as a result of potential spills of the stored product.	Prevent unnecessary pollution impacts on the surrounding environment.	6.5.1. Scheduled inspections should be implemented in order to assure and verify the integrity of hoses, piping and storage tanks.	Carry out thorough inspections of piping, loading hoses, and bunding for leaks, using a checklist.	Daily	Project Developer
		6.5.2. The operating personnel should undergo proper training to prevent overflowing incidents.	Proof of attendance to training sessions to be kept on file on site.	Once off (and thereafter as required for new operating personnel).	Project Developer
		6.5.3. 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.	<ul style="list-style-type: none"> • Adhere to best practice, chicken rearing and waste disposal norms. • 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. 	<ul style="list-style-type: none"> • Throughout Operation 	Project Developer
6.6. Atmospheric pollution due to fumes, smoke from fires.	Prevent unnecessary air pollution impacts as a result of the operational	6.6.1. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting	<ul style="list-style-type: none"> • Assurance of functionality of fire extinguishers via inspections and 	<ul style="list-style-type: none"> • Annually 	Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
	procedures.	equipment) should be provided.	certification by an accredited fire service company. <ul style="list-style-type: none"> Comply with the permit to work system. 		
6.7. 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.	6.7.1. Operational personnel must wear basic PPE (e.g. gloves, goggles etc.) as necessary during the operational phase.	<ul style="list-style-type: none"> Medical investigations or surveillance to be undertaken for the operating personnel. Keep a register of the medical records for the operating personnel. 	<ul style="list-style-type: none"> Once-off for every operating person. Once every five years for the life of the installation. 	Project Developer
6.8. 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.	6.8.1. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the site as required. Mobile fire-fighting equipment should be provided at the berths as a safety precaution during the vessel offloading process.	<ul style="list-style-type: none"> Draw up a schedule for inspections and maintenance. Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company. Draw up a schedule of safety audits. 	<ul style="list-style-type: none"> Once initially and revise as reliability of equipment is assessed. Annually Annually 	Project Developer
6.9. Increase in pest invertebrates	Highly localized pest invertebrate control that does not affect non-target populations or taxa	6.9.1. Detect and control pest infestations before they become a problem through frequent and careful cleaning, monitoring and control.	<p>Rinse floors regularly</p> <p>Provide sufficient ventilation and airflow to keep the chicken house (floors, bedding, fodder) as dry as possible.</p> <p>Check to see that fan louvers are properly working and close completely when the fan is not running.</p> <ul style="list-style-type: none"> Properly screed concrete floors to effectively seal all cracks and limit the 	As necessary	EHS Manager and Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			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 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 Maintain a high capacity slurry dam and manage it properly. Regularly empty slurry dam to prevent the accumulation of floating solids for extended periods of time (crust left on top of slurry soon become major breeding ground for flies) Electrocutation devices are available to kill flies, while other mechanical devices include traps, sticky tapes or baited traps.		

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		6.9.2. Detect pest infestations before they become a problem through frequent and careful monitoring.	<p>Manage and prevent access to fodder, especially feed wastage around the houses, feeders.</p> <p>Control rodents through effective sanitation, rodent proofing and killing.</p> <p>Glue boards and traps can be used in small areas, but in larger areas (over 12,000 sq ft) baits are more practical.</p> <p>Rodenticides are not advised.</p> <p>The most effective control for indigenous birds is screening production house air inlets and open windows with 2x2cm wire mesh.</p>	As necessary	EHS Manager and Project Developer
F. Water Conservation					

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
6.10. Impact on the regional water balance as a result of increased water usage from the borehole for the operations.	Reduce water usage during operations.	6.10.1. Water conservation to be practiced in line with Energy Saving Policies as follows: <ul style="list-style-type: none"> • 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. 	Record water usage, conduct audits and record non-compliance and incidents.	Monthly	Project Developer
G. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
6.11. 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.	6.11.1. 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
H. Stormwater Management					
6.12. Increased stormwater discharge into the surrounding environment.	Reduce the impact of increased stormwater discharge to the environment.	6.12.1. 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
		6.12.2. 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	Project Developer and EHS Manager
I. Waste Management					

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
6.13.Odour Emissions from operations and environmental contamination of the surrounding environment from chicken organic waste (carcasses and manure).	Prevent unnecessary air pollution impacts as a result of the operational procedures.	6.13.1. Odours produced from manure and urine in chicken egg-layer facilities can be reduced by scraping up and removing manure from the facility and washing down using low-volume high-pressure sprays.	On-site inspection of chicken egg-layer facilities and waste facility throughout operational phase.	Weekly	Project Developer and EHS Manager
		6.13.2. Manure should be collected daily and stored in vermin-proof containers at the waste storage facility.	<ul style="list-style-type: none"> • Monitor waste generation and collection throughout the operational phase. • Inspection of chemical storage facility in order to ensure correct storage and management procedures. 	Weekly	EHS Manager and Project Developer
		6.13.3. Ensure that carcasses and feed, and other operational waste are appropriately and effectively contained and disposed of without detriment to the environment.			
		6.13.4. Ensure that the development are designed and lined with impermeable substances (concrete) in accordance with advice from international best practice norms.			
		6.13.5. Establish appropriate emergency procedures for accidental contamination of the surroundings. Waste recycling should be incorporated into the facility's operations as far as possible. Designate a secured, access restricted,			

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		sign posted room for the storage of potentially hazardous substances such as herbicides, pesticides, dips and medications.			
		6.13.6. The relevant Air Quality norms and standards must be adhered to.	•		
6.14. Increased vertebrate and invertebrate pests.	Highly localised pest invertebrate control does not affect non-target population or taxa.	6.14.1. Detect and control pest infestations before they become a problem through frequent and careful cleaning, monitoring and control.	<ul style="list-style-type: none"> • Rinse floors regularly • Provide sufficient ventilation and airflow to keep chicken house (floors, bedding, fodder) as dry as possible. • Properly screed concrete floors to effectively seal all cracks and limit the pooling of effluent onsite. • Remove all trash, and sources of feed and water for pests from the outside perimeter of the facilities. • Keep grass and weeds mowed to 5 	As Necessary	EHS Manager and Project Developer
		6.14.2. Applicant to adhere to the Best Practice Guidelines and Animal Disease Act (Act 35 of 1984)			
		6.14.3. Poultry legislation guidelines should be adhered to.			

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			cm or less immediately around the facilities, to prevent insect growth.		
6.15. Pollution of surrounding environment as a result of the handling, temporary storage and disposal of chicken manure.	Reduce soil and groundwater contamination as a result of incorrect storage, handling and disposal of chicken waste.	6.15.1. Waste storage site should be constructed with concrete, block work and earth to avoid contamination into the soil or groundwater.	<ul style="list-style-type: none"> Monitor waste generation and collection throughout the operational phase. On-site inspection of Waste segregation 	Weekly	EHS Manager and Project Developer
		6.15.2. Chicken Manure should be stored in sufficient 12kg waste bags and skips (or similar. bags and skips should be covered with suitable material and correctly labelled.			
		6.15.3. Chicken manure should be removed every 6 weeks.			
6.16. 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.	6.16.1. Sufficient waste collection bins and skips (or similar) should be provided. Waste collection bins and skips should be covered with suitable material and correctly labelled.	Monitor waste generation and collection throughout the operational phase.	Weekly	EHS Manager
		6.16.2. Segregation of hazardous waste from general waste to be in place.	On-site inspection of waste segregation.	Weekly	EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		6.16.3. Ensure that the site is kept clean at all times and that operational personnel are made aware of correct waste disposal methods.	<ul style="list-style-type: none"> Conduct training for all operational personnel. 	<ul style="list-style-type: none"> Once-off during operations and ensure that all new staff are inducted. 	EHS Manager
		6.16.4. No solid waste may be burned or buried on site.	Monitor via site audits and record non-compliance and incidents.	Daily	EHS Manager
		6.16.5. Waste amounts shall be recorded on a monthly basis.	Waste amounts to be documented.	Monthly	EHS Manager/ Project Developer
J. Air Quality Management					
6.17. Emissions from staff vehicles and road tankers.	Reduce odours during the operational phase.	6.17.1. Ensure that the proposed project is operated in such a manner whereby potential odours are minimised.	<ul style="list-style-type: none"> Monitor via site audits and record non-compliance and incidents. Complaints about odours should be investigated and documented in a register. 	<ul style="list-style-type: none"> Daily When complaints are made. 	EHS Manager
K. Socio-Economic Management					
6.18. Employment creation and skills development opportunities during the operational phase.	Maximise local employment and local business opportunities to promote and improve the local economy.	6.18.1. 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
		6.18.2. Where the required skills do not occur locally, and where appropriate and applicable, ensure that relevant local individuals are trained.			
		6.18.3. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible.			
6.19. Increase in chicken eggs in the local area.	Maximise positive impacts through ensuring produce is sold to local markets	6.19.1. Ensure that the proposed project has secured local buyers.	Seek out local markets & secure formal trade agreements.	Monthly	Project developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
L. Environmental Awareness and Site Management					
6.20. Increased energy consumption during the operational phase.	Reduce energy consumption where possible.	6.20.1. Encourage the use of energy saving 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.	<ul style="list-style-type: none"> Monitor energy usage via site investigations. Conduct training for all operational personnel. 	<ul style="list-style-type: none"> Monthly 	EHS Manager
6.21. Inappropriate behaviour of site staff during the operational phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that staff are aware of the requirements of the EMPr.	6.21.1. 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
		6.21.2. Educate workers on the dangers of open and/or unattended fires.	Ensure fire safety requirements are well understood and respected by workers (by providing basic fire safety training).	On-going	EHS Manager
		6.21.3. 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.			
		6.21.4. Fire-fighting equipment must be made available at various appropriate locations.			

7. MANAGEMENT PLAN FOR THE DECOMMISSIONING PHASE

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

The infrastructure and equipment will only be decommissioned once it has reached the end of its economic life. The potential impacts resulting from development of the preferred site during the decommissioning phase of the activity are provided below.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
A. Visual Impacts					
7.1. 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.	7.1.1. Ensure that rubble and litter are appropriately stored and regularly removed from site to a licenced waste disposal facility. 7.1.2. Dust generation must be kept at a minimum. 7.1.3. 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					
7.2. Noise generation from demolition	Reduce the potential noise impacts on the	7.2.1. Decommissioning personnel must wear	Inspections to be carried out during the	Throughout the decommissioning	ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
activities (e.g. grinding, steel falling, use of angle grinders) during the decommissioning phase.	decommissioning personnel.	<p>proper hearing protection, which should be specified as part of the Decommissioning Phase Risk Assessment carried out by the Contractor.</p> <p>7.2.2. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE for use where appropriate.</p>	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 safety requirements of the Contract.	phase.	
7.3. Potential health injuries to demolition staff during the decommissioning phase.	Prevent respiratory illnesses caused to the decommissioning personnel.	7.3.1. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE (such as dust masks) for use where appropriate.	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	Throughout the decommissioning phase.	ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			the Contract.		
7.4. Heavy traffic, congestion and potential collisions.	Prevention of injuries, fatalities, and damage to equipment and vehicles during the decommissioning phase.	<p>7.4.1. Suitable parking areas should be created and designated for trucks and vehicles.</p> <p>7.4.2. A supervisor should be appointed to co-ordinate the traffic during the decommissioning phase.</p> <p>7.4.3. Road barricading should be undertaken where required and road safety signs should be adequately installed at strategic points within the site.</p>	Monitor activities and record and report non-compliance by undertaking inspections.	Throughout the decommissioning phase.	Project Developer, ECO and Contractor
7.5. Pollution of the surrounding water and ground as a result of spillages, generation of building rubble and	Prevent unnecessary pollution impacts on the surrounding environment.	7.5.1. 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

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
waste scrap material.		<p>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.</p> <p>7.5.2. 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.</p>			
C. Water Conservation					

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
7.6. Increased water usage during the decommissioning phase.	Reduce water usage during decommissioning processes.	7.6.1. Water conservation to be practiced in line with Energy Saving Policies as follows: <ul style="list-style-type: none"> • 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
		7.6.2. Carry out environmental awareness training with a discussion on water usage and conservation.	Conduct training for all decommissioning personnel.	<ul style="list-style-type: none"> • As and when necessary during decommissioning and ensure that 	EHS Manager, ECO and Contractor

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
				all new staff are inducted.	
D. Spill Contingency, Management and Handling of Chemicals/Dangerous Goods					
7.7.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.	7.7.1. 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
		7.7.2. 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
		7.7.3. Ensure that the toilet/sanitation facilities are regularly serviced and emptied.	Monitor via site audits and record non-compliance and incidents.	Monthly	EHS Manager and ECO
		7.7.4. Ensure that the	Monitor via site audits	Monthly	EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		decommissioning site camp and toilet/sanitation facilities are placed outside areas susceptible to flooding and beyond 32 m of the estuary.	and record non-compliance and incidents.		and ECO
E. Stormwater Management					
7.8. 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.	7.8.1. The appointed Contractor should compile a Method Statement for Stormwater Management during the decommissioning phase.	Compile Method Statement and take into account the Stormwater Management measures at the site.	Once off (and thereafter updated as required).	Contractor
		7.8.2. 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
F. Waste Management					
7.9. Pollution of the surrounding	Reduce soil and groundwater	7.9.1. Carry out management actions for the	Carry out monitoring for the	Carry out monitoring for	Project Developer

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
environment as a result of the handling, temporary storage and disposal of solid waste.	contamination as a result of incorrect storage, handling and disposal of general and hazardous waste.	decommissioning phase.	decommissioning phase.	the decommissioning phase.	and EHS Manager
G. Air Quality Management					
7.10. Air Quality Impact: Emissions from decommissioning vehicles and generation of dust as a result of earthworks and demolition	Reduce dust emissions during decommissioning activities.	7.10.1. 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					
7.11. Introduction and proliferation of alien species	Minimize introduction and effective control of alien species	7.11.1. By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must	Mechanical removal of these species is recommended. However, the removal must be carefully performed so as to not	Throughout the decommissioning phase.	Project Developer and EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Impact	Management Objectives	Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
		require a permit.	excessively disturb the soil layer.		
7.12. Sensory disturbances on Fauna	Minimise sensory disturbance surrounding faunal communities during decommissioning	7.12.1. 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 migratory) animals, should be least.	Throughout the decommissioning phase.	Project Developer and EHS Manager

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

8. SITE REHABILITATION

It will be necessary to completely remove all infrastructure associated with the chicken broiler facilities, and once that is achieved, rehabilitation of the site will be required. It is recommended that the developer take into account the appropriate land use requirements at the time. It is recommended that the developer take into account the appropriate land use requirements at the time. It is also important to note that in a period of 20-25 years, land uses in the area may change significantly, given the growing population and land use change in Mashau and the surrounding areas. Consultation with the local authority is encouraged as the rehabilitation should meet the requirements set out by the local authorities in accordance with any relevant legislation.

9. CONCLUSION

It is anticipated that if the chicken broiler facility is constructed, operated and decommissioned in accordance with the recommendations made herein, the project is unlikely to have significant adverse environmental impacts.

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

APPENDIX G: Other Information

CV'S of Environmental Assessment Practitioners

Minnelise Levendal

Rirhandzu Marivate



APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

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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

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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

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

- | | | |
|--------------------------|--------------------------------|------|
| ▪ 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 <i>(in progress)</i>	EIA for the proposed Electrawinds Swartberg wind energy project near Moorreesburg in the Western Cape	Project Manager	Electrawinds
2010-2011 <i>(in progress)</i>	EIA for the proposed Ubuntu wind energy project, Eastern Cape	Project Manager	WKN Windkraft SA
2010-2011 <i>(in progress)</i>	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 <i>(Environmental Authorisation granted in September 2011)</i>	EIA for a proposed wind farm near Swellendam in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd)
2010 <i>(complete)</i>	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 <i>(complete)</i>	Basic Assessment for the erection of two wind monitoring masts near Jeffrey's Bay in the Eastern Cape	Project Manager	Windcurrent (Pty Ltd)
2009-2010 <i>(Environmental Authorisations granted during 2010)</i>	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	Project Manager	SANBI

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Completion Date	Project description	Role	Client
	Framework Convention on Climate Change		
2009 <i>(Environmental Authorisation granted in 2009)</i>	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. (néé 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 ¹³C 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
<i>English</i>	<i>Excellent</i>	<i>Excellent</i>	<i>Excellent</i>
<i>Afrikaans</i>	<i>Excellent</i>	<i>Excellent</i>	<i>Excellent</i>

Minnelise Levendal



August 2016

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Rirhandzu Marivate (Project Manager)



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Position in Firm: Junior Environmental Assessment Practitioner
Full Name: Marivate, Rirhandzu Anna
Specialisation: Environmental & Ecological Science
Professional Registration: Cand. Sci. Nat. Environmental Sciences – Registration 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 focused on investigating ecological knowledge of stakeholder on the provisioning of freshwater resources and its impacts on the management of the Berg river in the Western Cape, South Africa.

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. 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).

EXPERIENCE

Completion Date	Project description	Role	Client
2014 (in progress)	Special Needs and Skills Development Programme: Programme management and conduction of Basic Assessment for disadvantaged communities/businesses/enterprises	Project Manager; Stakeholder engagement & Project Support	National Department of Environmental Affairs (DEA)
2013- 2014	Monitoring and Evaluation for the National Strategy for Sustainable Development	Stakeholder engagement, Research, Report Writing	National Department of Environmental Affairs (DEA)
2013-2015	Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa	Data Management	National Department of Environmental Affairs (DEA)
2014 (in progress)	Strategic Environmental Assessment (SEA) for Electricity Grid Infrastructure (EGI)	Stakeholder engagement	National Department of Environmental Affairs (DEA)

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

Completion Date	Project description	Role	Client
2014	Screening Study (SS) for the Development of Biochar and Composting Facilities to support land restoration near the proposed Ntabelanga Dam, Umzimvubu Catchment, Eastern Cape	Project Manager, Project Research & Report Writing	National Department of Environmental Affairs (DEA)
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)
2015-2016	Development of 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

EMPLOYMENT RECORD

- **2014** CSIR Environmental Management Services (EMS) Environmental Assessment Practitioner (EAP) Intern
- **2011-2012** UCT Environmental & Geographical Science Department (K Vickery) Teaching Assistant
- **2010** WITS School of Animal Plant & Environmental Sciences (Prof K Balkwill) Teaching Assistant
- **2009** ESKOM Generation Environmental Management (D Herbst) Environmental Officer-Vacational Intern
- **2009** WITS School of Geosciences (Dr G Drennan) Teaching Assistant
- **2009** WITS School of Geosciences (Dr M Evans) Field Assistant
- **2008** WITS School of Animal Plant & Environmental Sciences (T Gardiner) Field Assistant
- **2008** WITS School of Animal Plant & Environmental Sciences (Dr W Twine) Environmental Control 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

- 2015 Practical Adaptation for vulnerable communities by Adaptation Network, Kirstenbosch Botanical Gardens, Cape Town, August 2016.
- 2015 International Association for Impact Assessors South Africa (IAIA) National Annual Conference, August 2016, Drakensberg.
- 2015 Sharpening the Tool: New Techniques & Methods in Environmental Impact Assessments, SE Solutions, Stellenbosch, Western Cape
- 2014 Activate Change Drivers Leadership and Community Development Training March to October 2014, Western Cape
- 2014 CiLLA Project Management I Course on July 2014 at CSIR Stellenbosch
- 2014 International Association for Impact Assossors South Africa (IAIA) Air Quality Management (AQM) Workshop on June 2014 in Western Cape

APPENDICES

Basic Assessment for the development of a 0.6 hectare chicken egg-layer facility on a 7.8 hectare farm in Mashau-Bodwe Village, Makhado District, Limpopo.

- 2014 South African Environmental Observation Network (SAEON) Graduate Student Network (GSN) Annual Conference September 2014, Eastern Cape.
- 2014 IAIAAsa 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 (IAIAAsa) 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, Western Cape
- 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 (IAIAAsa) 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