Final Basic Assessment Report – Proposed Expansion of a Pig Production Enterprise for Legae La Thlago (Pty) Ltd
Plot 684 Agricultural Holdings, Winterveldt, Pretoria

FINAL BASIC ASSESSMENT REPORT

Report prepared for:
Legae La Tlhago (Pty) Ltd

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NOVEMBER 2016
CSIR Report Number:
CSIR/02100/EMS/IR/2016/0002/A
GDARD Reference Number: 002/16-17/I0003

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Basic Assessment Process

FINAL BASIC ASSESSMENT REPORT –PROPOSED EXPANSION OF A PIG PRODUCTION ENTERPRISE FOR LEGAE LA THLAGO (PTY) LTD

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Prepared by:
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Babalwa Mqokeli and Minnelise Levendal

report details

Title:	**Basic Assessment for the Legae La Tlhago (Pty) Ltd's proposed expansion of a pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.**
Purpose of this report:	The purpose of this BA Report is to: • Present the proposed project and the need for the project; • Describe the affected environment at a sufficient level of detail to facilitate informed decision-making; • Provide an overview of the BA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; • Provide an Environmental Management Programme (EMPr) for the proposed project. This BA Report is the Final Version submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) for decision-making.
Prepared for:	Legae La Tlhago (Pty) Ltd
Prepared by:	CSIR P O Box 320, Stellenbosch, 7599 Tel: +27 21 888 2432 Fax: +27 21 888 2693
Authors:	Babalwa Mqokeli and Minnelise Levendal
CSIR Report Number:	CSIR/02100/EMS/IR/2016/0002/A
Date:	November 2016
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environmental assessment practitioner

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Telephone No.	021 888 2432
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Project Team:

Name	**Qualification & Expertise**
Minnelise Levendal	• MSc Biological Science (Botany) (Stellenbosch University • 16 years of experience in Environmental Management • Inclusive of 10 years' experience in conducting Environmental Assessments
Babalwa Mqokeli **(Project Manager)**	• MSc Ecological Science (University of KwaZulu-Natal) • 2 years' experience in the environmental management field (Terrestrial & Aquatic Ecology) • Over 1 years' experience conducting Basic Assessments

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

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Background description

Legae La Tlhago (Pty) Ltd is a small-scale pig and vegetable farming enterprise located on an 8 hectare farm on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. The business consists of 4 members and they propose to expand the Pig Farming division of the enterprise by developing a 1.05 ha pig facility, with a maximum capacity of 1049 pigs, as well as two waste dams measuring 50 m^3 and 31.25 m^3. The current operations of the business comprise of a 10 sow piggery and cultivation of vegetables. The proposed expansion is for a 100 sow unit, with targets to supply major supermarkets and butcheries within the Mabopane, Soshanguve, Ga-Rankuwa and the Tshwane Markets. Legae La Tlhago's proposed piggery expansion will add great socio-economic value to the pork industry in the area, to the consumer, the business, and to allow local employment opportunities, as well as contributing greatly to the farming industry of South Africa.

Legal requirements and legislative process

As part of the proposed project, listed activities defined under the National Environmental Management Act, Act No. 107 of 1998 (NEMA, 1998), as amended, in terms of the Environmental Impact Assessment (EIA) Regulations, Government Notice (GNR) 983 of 4 December 2014, and in terms of the National Environmental Waste Act (NEM:WA) Regulations GNR 921 of 29 November 2013 there under will take place. Relevant listed activities triggered by the proposed activities are indicated below:

GNR.983 Activity 27: *The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-*
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

GNR. 983 Activity 39: *The expansion and related operation of facilities for the concentration of animals for the purpose of commercial production in densities that will exceed-*
(ii) 8 square meters per small stock unit, where the expansion will constitute more than;
(b) 250 additional pigs, excluding piglets that are not yet weaned;

GNR. 921 Category A (1): *The storage of general waste in lagoons.*

GNR. 921 Category A (12): *The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).*

This Basic Assessment Report (BAR) aims to provide the necessary information relating to the proposed project activities, as required in terms of the 2014 NEMA EIA Regulations.

Anticipated impacts

The aim of the environmental assessment is to identify potential impacts associated with the development and to recommend methods to avoid or reduce adverse impacts and promote positive impacts. A summary of potential significant impacts that have been identified during the basic assessment process is as follows:

Summary of potential impacts	Significance rating of impacts before mitigation	Significance rating of impacts after mitigation
Impact on soil (erosion and dust)	Medium	Low
Loss of vegetation and faunal habitat	Low	Low
Impact on Conservation Important species	Low	Low
Introduction and increase in alien vegetation	High	Low
Impact on wetland habitat	High	Low
Potential for pollution of water sources	High	Low
Waste generation	Medium	Low
Impact of pests and disease transmission	High	Low
Impact of increased traffic	Low	Low
Employment opportunities created	Medium	High

An Environmental Management Programme (EMPr) has been compiled (refer to Appendix H) for the proposed piggery expansion, with the aim of serving as an applicable document to follow in order to manage and mitigate identified potential negative impacts associated with the project. Implementing effective mitigation measures will assist in reducing the potential impacts on the surrounding environment during both the construction and operational phases of the proposed development. With the implementation of the mitigation measures as suggested in the EMPr, i.e. avoiding the wetland and its associated buffer area, as well as not encroaching on the Open Acacia Sandy Bushveld area, the significance of most of the impacts associated with the proposed development is Low.

EAPs Recommendation

Based on the findings of the Basic Assessment process for Legae La Tlhago's proposed piggery expansion, it is recommended that this project be authorised, subject to the following conditions:

1) The EMPr of this proposed development must form part of the contractual agreement and be adhered to by both the contractors and the applicant.

2) The recommendations of the ecological specialist, including moving out of or avoiding the wetland, must be implemented.

3) The applicant must ensure compliance with the conditions of the Environmental Authorisation and EMPr during all the phases of the project.

4) A Waste Management Licence must be obtained from the Gauteng Department of Agriculture and Rural Development (GDARD) for the storage of pig waste in the lagoon.

5) A Water Use Licence must be obtained from the Department of Water and Sanitation (DWS) for the water usage associated with the piggery operations as well as the re-use of waste water for fertilisation.

Legae La Tlhago is being assisted *pro-bono* under the DEA Special Needs and Skills Development Programme, which is a programme aimed to assist small-medium scale emerging farmers/businesses who do not have the financial means to pay for environmental services, as such do not have the financial opportunity to have more than one alternative site available, it is therefore recommended by the EAPs that the proposed site and layout be included in the Environmental Authorisation.

It is the opinion of the EAP that the proposed expansion and/or upgrade will comply with current relevant environmental legislation, and that with the implementation of the mitigation measures suggested in this BAR, there are no environmental impacts of high significance identified after mitigation. An ecological specialist study was conducted to inform the BA to ensure that the proposed layout avoids areas of high sensitivity. Based on the above, it is therefore recommended that the proposed development be granted Environmental Authorisation.

glossary

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

Requirements according to Appendix 1 of GNR 982 of 4 December 2014- Scope of Assessment and Content of BAR.

Scope of Assessment and Content of BAR	SECTION IN BAR
1) A basic assessment report must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must include - (a) details of – i. the EAP who prepared the report; and	Page 2
ii. the expertise of the EAP, including a curriculum vitae;	Page 2 Appendix I
(b) the location of the activity, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section A Appendix A
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Appendix A
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered and being applied for; and (ii)a description of the activities to be undertaken including associated structures and infrastructure ;	Section A
(e) a description of the policy and legislative context within which the development is proposed including- (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	Section A2

Scope of Assessment and Content of BAR	SECTION IN BAR
(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Section E7
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section B9 Section E9
(g) a motivation for the preferred site, activity and technology alternative;	Section A3
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section A3 Appendix E Section B Appendix G Section E Appendix F
(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be	Section E, Appendix G Appendix H

Scope of Assessment and Content of BAR	SECTION IN BAR
avoided or addressed by the adoption of mitigation measures;	
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	Section E Appendix G
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Appendix H
(l) an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (i) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section E Appendix A Appendix G
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	Section E Appendix G Appendix H
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Appendix G
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Appendix G Section E
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Appendix G Section E8
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(r) an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports;	Appendix I

Scope of Assessment and Content of BAR	SECTION IN BAR
(ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	Section C Appendix E
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t) any specific information that may be required by the competent authority; and	N/A
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

Final Basic Assessment Report – Proposed Expansion of a Pig Production Enterprise for Legae La Thlago (Pty) Ltd
Plot 684 Agricultural Holdings, Winterveldt, Pretoria

FINAL BASIC ASSESSMENT REPORT

contents

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

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

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by GDARD in terms of the EIA Regulations, 2014.

2. This application form is current as of 8 December 2014. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

3. **A draft Basic Assessment Report must be submitted, for purposes of comments within a period of thirty (30) days, to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken.**

4. **A draft Basic Assessment Report (1 hard copy and two CD's) must be submitted, for purposes of comments within a period of thirty (30) days, to a Competent Authority empowered in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended to consider and decide on the application.**

5. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.

6. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

7. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.

8. An incomplete report may lead to an application for environmental authorisation being refused.

9. **Any report that does not contain a titled and dated full colour large scale layout plan of the proposed activities including a coherent legend, overlain with the sensitivities found on site may lead to an application for environmental authorisation being refused.**

10. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the application for environmental authorisation being refused.

11. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.

12. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.

13. Although pre-application meeting with the Competent Authority is optional, applicants are advised to have these meetings prior to submission of application to seek guidance from the Competent Authority.

DEPARTMENTAL DETAILS

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

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

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

(For official use only)

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

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

N/A

Is a closure plan applicable for this application and has it been included in this report? NO

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

The piggery has been operating for 2 years and will continue to exist, and there are therefore no intended plans to close the piggery.

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

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

If no, state reasons for not attaching the list.

Have State Departments including the competent authority commented? Yes

If no, why?

INTRODUCTION

Project background

Legae La Tlhago (Pty) Ltd is a small-scale pig and vegetable farming enterprise located on an 8 hectare farm on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. The business consists of 4 members and they propose to expand the Pig Farming division of the enterprise by developing a 1.05 ha pig facility, with a throughput of 1049 pigs, as well as a 200.96 m^2 slurry dam. The current operations of the business comprise of a 10 sow piggery and cultivation of vegetables. The proposed expansion is for a 100 sow unit, with targets to supply major supermarkets and butcheries within the Mabopane, Soshanguve, Ga-Rankuwa and the Tshwane Market. Legae La Tlhago's proposed piggery expansion will add great socio-economic value to the pork industry in the area, to the consumer, the business, and to allow local employment opportunities, as well as contributing greatly to the farming industry of South Africa.

The proposed infrastructure of the piggery upon completion will entail the following:

1 x Boar house
1 x Farrowing house
1 x Weaner house
1 x Grower house
1 x 50m^3 Waste dam
1 x 31.25m^3 Waste dam (overflow dam for re-use of waste water)

Housing units will consist of a combination of slated and concrete floors. The pig waste will fall through the slatted floor, and will be temporarily stored under the slatted floor in a waste holding pit until it is flushed to flow through an enclosed gutter conveying it to a concrete slurry dam. The waste dam will always have water covering the solid waste allowed to settle at the bottom of the slurry dam to trap the smell. As the solids fill the lagoon the clear water on top will overflow into the overflow dam where it will be disinfected and pumped back to the piggery for cleaning purposes. After the minimum digestion period elapses the waste will be pumped out onto the fields as a fertilizer. Both concrete dams will be made water tight.

Pig production will include the following operational process:

- Young sows will be purchased during the course of the year to allow for breeding to occur consecutively throughout the year. 30 week old sows will then be placed with the boars for breeding.
- Breeding sows will then be moved to the Farrowing house, and fed on a balanced feed.
- After delivery, piglets are weaned at 28 days to be housed at the Weaner house, and the sow goes back to the boar house to start the cycle.
- 10 weeks old weaners are then transferred to the Grower house, where they are kept until they reach a marketable size. Once the pig reaches a live weight of approximately 100 kilograms, then it is ready to be sold, that is it has reached its marketable size. These will then be sold to abattoirs and/or butcheries in the local area.

Listed Activities

As part of the proposed piggery expansion, listed activities defined under the National Environmental Management Act, Act No. 107 of 1998 (NEMA, 1998), as amended, in terms of the Environmental Impact Assessment (EIA) Regulations, Government Notice (GNR) 983 of 4 December 2014, and in terms of the

National Environmental Waste Act (NEM:WA) Regulations GNR 921 of 29 November 2013 there under will take place. Relevant listed activities triggered by the proposed activities are described as follows:

GNR.983 Activity 27: *The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-*
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

GNR. 983 Activity 39: *The expansion and related operation of facilities for the concentration of animals for the purpose of commercial production in densities that will exceed-*
(ii) 8 square meters per small stock unit, where the expansion will constitute more than;
(b) 250 additional pigs, excluding piglets that are not yet weaned;

GNR. 921 Category A (1): *The storage of general waste in lagoons.*

GNR. 921 Category A (12): *The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).*

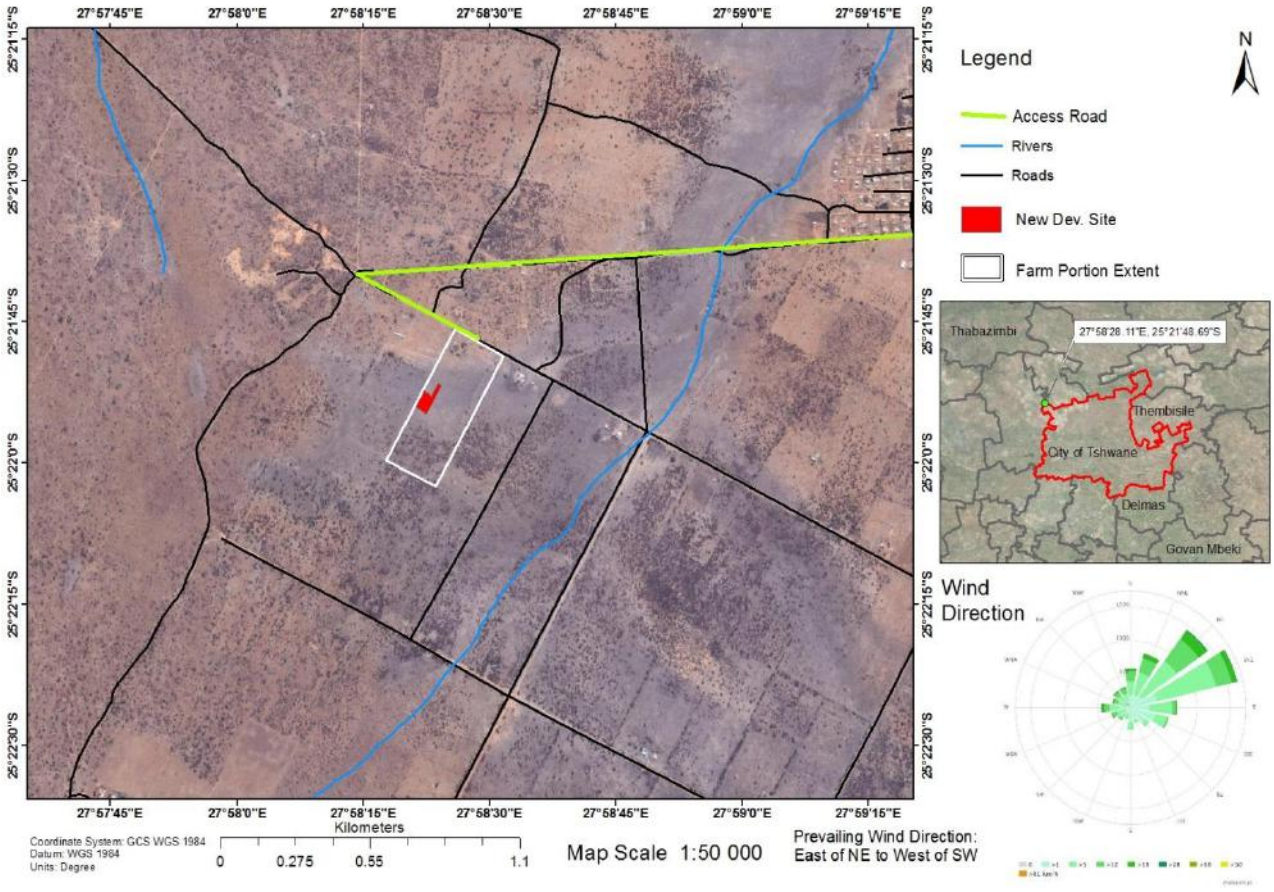


Figure 1: Location of the proposed extension of a pig production facility of Legae La Tlhago on Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.

SECTION A: ACTIVITY INFORMATION

1. PROPOSAL OR DEVELOPMENT DESCRIPTION

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

Basic Assessment for the proposed expansion of a pig production enterprise for Legae La Tlhago (Pty) Ltd on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.

Select the appropriate box

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

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

YES [redacted]

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

National Environmental Management Waste Act GNR. 921 of 29 November 2013, and the Competent Authority is the Gauteng Department of Agriculture and Rural Development (GDARD).

National Water Act, 1998 (Act 36 of 1998), and the Competent Authority is the Department of Water and Sanitation.

National Heritage Resources Act (Act 25 of 1999), and the Competent Authority is the South African Heritage Resources Agency (SAHRA).

If yes, have you applied for the authorisation(s)? YES [redacted]
If yes, have you received approval(s)? (attach in appropriate appendix) [redacted] NO

2. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

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

Title of legislation, policy or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998 as amended).	National & Provincial	27 November 1998
NEMA Environmental Impact Assessment Regulations GNR 982 of 4 December 2014	National & Provincial	4 December 2014
National Water Act 36 of 1998	National & Provincial	26 August 1998
National Environmental Management Waste Act GNR 921	National & Provincial	29 November 2013
National Environmental Management Biodiversity Act 10 of 2004	National & Provincial	2004
National Heritage Resources Act 25 of 1999	National & Provincial	1999
National Development Plan	National	2012
City of Tshwane Metropolitan Municipality IDP and SDF	Provincial	2014/2015 & 2011-2016

Description of compliance with the relevant legislation, policy or guideline:

Legislation, policy of guideline	Description of compliance
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998 as amended).	An application for Environmental Authorisation for the proposed development is submitted in terms of GNR 982 of NEMA EIA Regulations, 4 December 2014, promulgated under NEMA.
GNR 982 of NEMA EIA Regulations, 4 December 2014	To promote integrated environmental management, contents of this BAR adhere to the requirements of the EIA Regulations. Appendix H includes the Environmental Management Programme that the project will adhere to if authorisation is received. Appendix E refers to the Public participation followed thus far in undertaking this assessment.
National Environmental Management: Waste Act (NEM:WA) GNR 921, 29 November 2013	An application for a Waste Management Licence will be submitted in terms of NEM:WA as the proposed activity pertains to the following activities included in the Act: Category A (1): The storage of general waste in lagoons. Category A (12): The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).
National Water Act, 1998 (Act 36 of 1998)	Water Use Licence Application (WULA)
National Development Plan	The South African Government through the Presidency has published a National Development Plan. The Plan aims to eliminate poverty and reduce inequality by 2030. The Plan has the target of developing people's capabilities to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety. It proposes to implement the following strategies to address the above goals: 1. Creating jobs and improving livelihoods; 2. Expanding infrastructure; 3. Transition to a low-carbon economy; 4. Transforming urban and rural spaces; 5. Improving education and training; 6. Providing quality health care; 7. Fighting corruption and enhancing accountability; 8. Transforming society and uniting the nation.
National Heritage Resources Act, 1999 (Act 25 of 1999)	An application for Heritage Resources review was submitted to SAHRA (Case ID: 9784) in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) as amended.
National Environmental Management: Biodiversity Act 10 of 2004	The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) as amended (NEMBA) including all the pertinent legislation published in terms of this act was considered in undertaking this Basic Assessment process. This included the determination and assessment of the fauna and flora prevailing in the proposed project and the handling thereof in terms of NEMBA.
City of Tshwane Metropolitan Municipality IDP	The Spatial Development Framework (SDF) is the legislated

Legislation, policy of guideline	Description of compliance
and SDF	component of the municipality's Integrated Development Plan (IDP) that prescribes development strategies and policy guidelines to restructure and reengineer the urban and rural form. The SDF is the municipality's long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The proposed project has considered and is guided by the Regions' SDF and IDP priorities of the area.

3. ALTERNATIVES

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

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

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

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

The proposed alternative was considered based on the location of the existing piggery and re-aligned accordingly to avoid the sensitivities on site as determined by the ecological specialist study undertaken as part of the Basic Assessment process. No other additional location alternatives have been proposed for the project as this is the only site available for the applicant, which forms part of an existing development, with the farm also limited in terms of size.

Provide a description of the alternatives considered

No.	**Alternative type**, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	Description
1	Proposal	The proposed project involves the expansion of an existing piggery on Plot 684 Winterveldt Agricultural Holdings. The entire farm comprises 8.5 hectares. The proposed piggery facilities will occupy a tenth of the entire farm (i.e. 1.05 ha), and the remainder of the land is intended for vegetable production. The proposed development expansion aims to improve current piggery production and exercise best practices that are in line with new legislation and standards on pig welfare. This is aimed through the expansion and upgrade of the facility, with the business increasing operations from the existing piggery which was initially a 10 sow unit to a 100 sow unit piggery.

No.	**Alternative type**, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	**Description**
		The proposed piggery will, upon completion, include the following pig houses: 1 x Boar house 1 x Farrowing house 1 x Weaner house 1 x Grower house The application is for the construction of pig house units with a maximum capacity of 1 049 pigs at the farm, during full operation. These units will be constructed adjacent to the existing pig facilities. The housing units will consist of a combination of slated and concrete floors. The farm currently has a 50 m^3 waste dam that is not operational, this will however not be used as it is close to the wetland area. Two new dams are proposed, comprising 50 and 31.25 m^3 respectively. The 31.25 m^3 dam will contain overflow waste water from the 50 m^3 dam. The waste dam will be designed to store waste for a minimum period of 3 months to allow for anaerobic digestion to take place. The dam will always have water covering the solid waste, allowing the solid waste to settle at the bottom of the lagoon to trap the smell. As the solids fill the lagoon the clear water on top will overflow into the smaller second dam or the overflow lagoon were it will be disinfected and pumped back to the piggery for cleaning purposes. After the minimum digestion period lapses the waste will be pumped out onto the fields as a fertilizer. Both lagoons will be made water tight. Natural ventilation is used in all the existing housing units, and will also be used in the proposed units. The houses are designed with pitched roofs and curtains on both of the long sides. The side curtains are used to control the amount of airflow through the units and manually opened and closed when required. Feed storage silos will be used to store the dry bulk feed and the feed will be manually collected from the storage silos and used to fill up self-feeders installed in each of the pens. Fresh water will be constantly supplied to the housing units through nipples installed in each of the pens. Buffer tanks are used to temporarily store fresh water for this purpose.
2	Property Alternative	Alternative properties or locations for the proposed activity have not been identified, due to the fact that the proposed development is for the expansion of an existing facility. The owners were only able to acquire this land parcel, and it would not be economically feasible for the business to find and or purchase new property. Environmental impacts would be significantly higher if a new facility was to be established compared to expanding an existing facility. Therefore, no

No.	**Alternative type**, either alternative: site on property, properties, activity, design, technology, energy, operational or other(provide details of "other")	**Description**
		alternate properties have been investigated in the Basic Assessment.
3	Activity Alternative	The piggery is an existing operation on site and therefore an alternative activity has not been assessed or identified. It would not be economically feasible or practical for the applicant to embark on a different activity on the site.
4	Design or Layout Alternative	The proposed design and layout of the activity is more of a biosecurity measure, allows for more effective management of pork production as it lessens the risk of the pigs catching diseases if the activity is in a more prone or exposed location. The preferred proposed layout is on part of the property which has the least impact on the environment and is away from the wetland seep on site. Therefore no alternative layouts have been proposed as the current and preferred layout are on transformed land with relatively low impact significance and allow for the most efficient compliance to pig welfare legislation and ultimately maximising pig production.
5	Technology to be used	The proposed technology to be used complies with pig farming standards, and will advocate pig welfare and best practices in pig production. No alternate technologies have been investigated as the proposed technologies will follow SAPPOs guidelines in terms of best practices associated with pig farming.

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

MOTIVATION:

Site location and layout alternatives

Legae La Tlhago has been identified as a client under the "Special Needs and Skills Development Programme", which is a *pro bono* programme aimed at providing environmental services to small-medium scale businesses, Community Trusts etc who do not have the financial means to comply with the EIA Regulations. The Department of Environmental Affairs (DEA) commissioned the Council for Scientific and Industrial Research (CSIR) to manage the Programme to assist these clients with undertaking Basic Assessments to obtain Environmental Authorisation for their proposed developments.

The proposed development is for the expansion of an existing piggery and as such, Legae La Tlhago has not identified an alternative location or property due to the fact that this is the only land parcel they could acquire. The layout of the proposed project is a biosecurity measure aimed to minimise and/or control entry to the pig facility thus minimising the spread of diseases, and has also been guided by the findings of the Ecological Impact Assessment (Appendix G) in order to avoid impacts on areas of high conservation. Environmental impacts associated with this development would be exacerbated in establishing a new facility compared to expanding on an already existing facility.

Activity Alternative

When conducting due diligence for a suitable enterprise, Legae La Thlago considered an enterprise that would be suitable for the relatively small size of the farm as well as one that would maximize on quality of the product and display good potential for growth along the value chain. Pork production was considered as the industry is

growing, with the potential for opportunities in this industry such as pork production increasing by an annual average of 4.5%, second to broiler production which grew by 6%, production turnaround for pork is quicker and demand fundamentals for this product are unlikely to change. This industry also presents opportunities as there is a huge potential in the rural markets and exports to the SADEC region.

Design & Technology Alternatives

The design and operating plan for the proposed piggery expansion is guided by extensive market research and an assessment of the need of the products that will be produced adding great economic value to the area. The proposed design and technology include the following:

Housing
Housing units will consist of a combination of slated and concrete floors. Floors will be cleaned by using a pressure cleaner and the waste together with the cleaning water will flow into a waste dam/lagoon. As the solids fill the lagoon the clear water on top will overflow into the overflow lagoon were it will be disinfected and pumped back to the piggery for cleaning purposes. Solid waste will be used as fertiliser for the vegetable crops.

Ventilation
Natural ventilation is used and proposed on all the housing units, the houses are designed with pitched roofs and curtains on both of the long sides. The side curtains are used to control the amount of airflow through the units and manually opened and closed when required.

The proposed development will therefore not utilise intensive technologies, which require high energy demand. The proposed development will require very little energy and will use resource saving techniques.

In conclusion, as the proposed development is an expansion of an existing piggery, and also considering the abovementioned factors of the industry and the proposed technological techniques and farming methods, Legae La Tlhago proposes these preferred alternatives to be taken forward during the Assessment of this project.

4. PHYSICAL SIZE OF THE ACTIVITY

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

	Size of the activity:
Proposed activity ***(Total environmental (landscaping, parking, etc.) and the building footprint)***	Approximately 2.021 ha
Alternatives:	
Alternative 1 (if any)	[redacted]
Alternative 2 (if any)	
	Ha/ m^2

or, for linear activities:

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

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

	Size of the site/servitude:
Proposed activity	8 ha

Alternatives:
Alternative 1 (if any)
Alternative 2 (if any)

[redacted]
Ha/m^2

5. SITE ACCESS

Proposal

Does ready access to the site exist, or is access directly from an existing road?	YES [redacted]
If NO, what is the distance over which a new access road will be built	N/A m

Describe the type of access road planned:

N/A: existing access

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

Alternative 1

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

Describe the type of access road planned:

N/A

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

Alternative 2

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

Describe the type of access road planned:

N/A

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

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

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

(only complete when applicable)

6. LAYOUT OR ROUTE PLAN

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

- the layout plan is printed in colour and is overlaid with a sensitivity map (if applicable);
- layout plan is of acceptable paper size and scale, e.g.
  - A4 size for activities with development footprint of 10sqm to 5 hectares;
  - A3 size for activities with development footprint of > 5 hectares to 20 hectares;
  - A2 size for activities with development footprint of >20 hectares to 50 hectares);

- A1 size for activities with development footprint of >50 hectares);

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

Note from CSIR: **A Locality map depicting the current and proposed piggery facility onthe farm has been included as Appendix A. Photographs indicating sensitive features on site can also be found in this Appendix and in the Ecological Specialist Report (NSS, May 2016) attached as Appendix G.**

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

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

7. SITE PHOTOGRAPHS

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

Note from CSIR: **Site photographs in the eight major compass directions have been included as Appendix B. Photographs indicating sensitive features on site can also be found in the Ecological Specialist Report (NSS, May 2016) attached as Appendix G.**

8. FACILITY ILLUSTRATION

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

Note from CSIR: **An illustration of the structures for the current and proposed activities on site has been included as Appendix C.**

SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

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

Instructions for completion of Section B for linear activities

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

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

N/A

Instructions for completion of Section B for location/route alternatives

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

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

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

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

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

N/A

Section B - Section of Route | **N/A** | (complete only when appropriate for above)

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

1. PROPERTY DESCRIPTION

Property description: (Including Physical Address and Farm name, portion etc.)	Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria

2. ACTIVITY POSITION

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

Alternative:	**Latitude (S):**	**Longitude (E):**
	-25.368214°	27.985096°

In the case of linear activities:

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

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

Addendum of route alternatives attached

The 21 digit Surveyor General code of each cadastral land parcel

PROPOSAL	
Alt. 1	
Alt. 2	
etc.	

**** Note from CSIR: there is no SG code available for the site, please refer to the coordinates ABOVE**

3. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Flat	

4. LOCATION IN LANDSCAPE

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

	Plain X	

5. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

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

Shallow water table (less than 1.5m deep)		NO

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

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

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

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

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

o

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

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

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

o

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

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

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

o

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

6. AGRICULTURE

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

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

7. GROUNDCOVER

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

NOTE FROM CSIR: All Conservation Important species on Site have been included in the Ecological Specialist Report (NSS, May 2016) attached as Appendix G.

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

Natural veld - good condition % = 36.87		Veld dominated by alien species % = 24.45	
	Cultivated land % = 29.28	Building or other structure % = 4.63	Bare soil % = 4.77

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

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

If YES, specify and explain:

Inputs from the Ecological Specialist Report – Appendix G (NSS, 2016):

Although no Red Listed species were recorded on the site, the Protected *Duvalia polita* was located on site. This species is considered a Protected species under the Nature Conservation Ordinance, 12 of 1983. Protected species may not be cut, disturbed, damaged, destroyed without obtaining a permit from Gauteng Province or a delegated authority.

In terms of 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 under a licence granted by the Minister.

Duvalia polita

Sclerocarya birrea subsp. *caffra*

Figure 7-1. Photographs of Conservation Important plant species on Site.

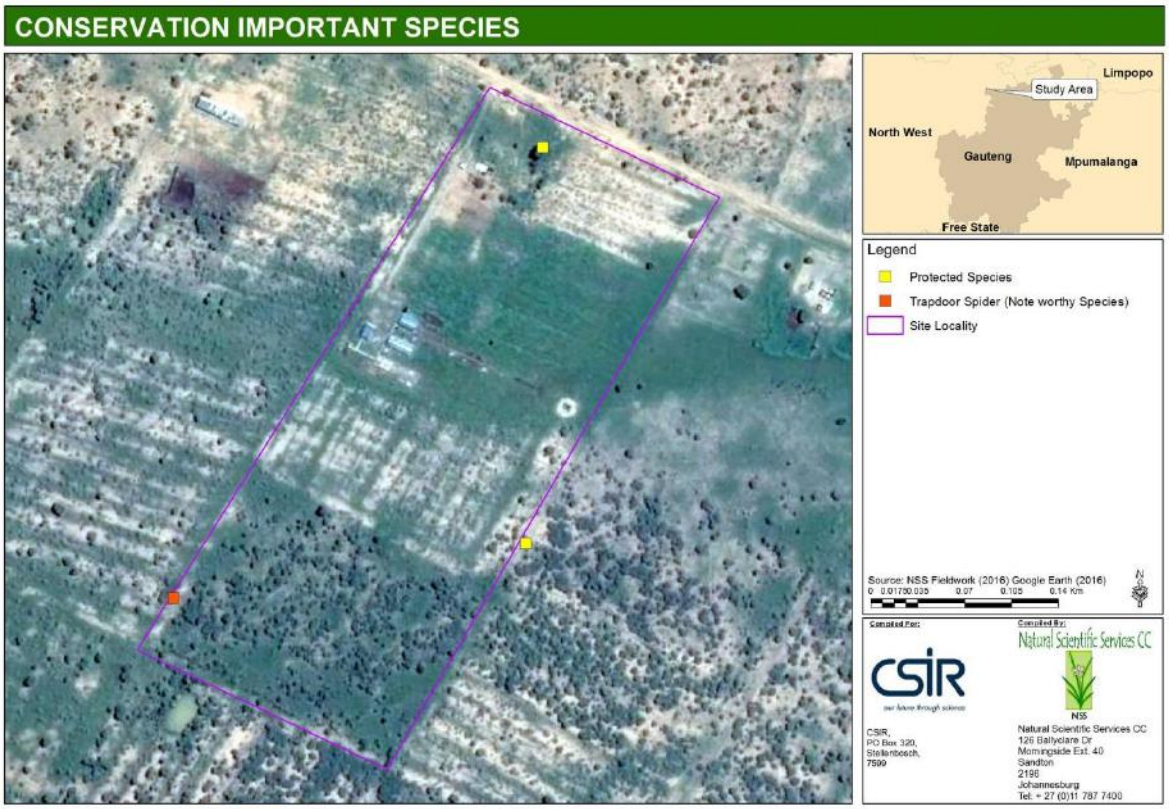


Figure 7-2: Location of Conservation Important Species on Site.

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

If YES, specify and explain:

[redacted]

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

If YES, specify and explain:

A temporary seep wetland is present on the eastern boundary of the site and is identified as a sensitive habitat (Ecological Specialist Report – Appendix G (NSS, 2016)). A seep is a wetland area located on gently to steeply sloping land and dominated by colluvial (i.e. gravity driven), unidirectional 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. The seep identified on site was temporary 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".

Was a specialist consulted to assist with completing this section	YES [redacted]

If yes complete specialist details

Name of the specialist:	Natural Scientific Services CC (NSS) Contributors and Authors: Susan Abell

Qualification(s) of the specialist:	MSc Resource Conservation Biology (Ecology) (2000 – 2001) BSc Hons University of the Witwatersrand, Johannesburg (1999) BSc University of the Witwatersrand, Johannesburg (1998)		
Postal address:	126 Ballyclare Dr Morningside ext 40 Sandton, Johannesburg		
Postal code:	2196		
Telephone:	(011) 787-7400	Cell:	[redacted]
E-mail:	susan@nss-sa.co.za	Fax:	
Are any further specialist studies recommended by the specialist?			NO
If YES, specify:	[redacted]		
If YES, is such a report(s) attached?			
If YES list the specialist reports attached below	[redacted]		

Signature of specialist: See Note Below Date:

Note from CSIR: **Please see the Specialist Declaration as per Appendix 6 of the NEMA EIA Regulations 2014) on Page 5 of the Ecological Specialist Report, attached as Appendix G.**

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

8. LAND USE CHARACTER OF SURROUNDING AREA

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

1. Vacant land	2. River, stream, wetland	[redacted]
[redacted]	7. Agriculture	
		34. Small Holdings

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

NORTH

	2	**34**	**34**	**34/7**	**1**
	1	**1**	**34**	**34**	**34**
WEST	**2**	**1**	Site	**2 / 34**	**34**	EAST
	1	**2**	**1**	**1**	**1**
	1	**1**	**1**	**1**	**1**

SOUTH

Note from CSIR: **The proposed development is surrounded by a few holdings with some agricultural practices and the dwellings are fairly spaced apart. It is also surrounded by a few small wetlands. Please see locality and aerial maps for an indication of the seeps/wetlands and holdings (Page 31, 38 & 52 of the Ecological Report, Appendix G).**

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

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

Have specialist reports been attached YES

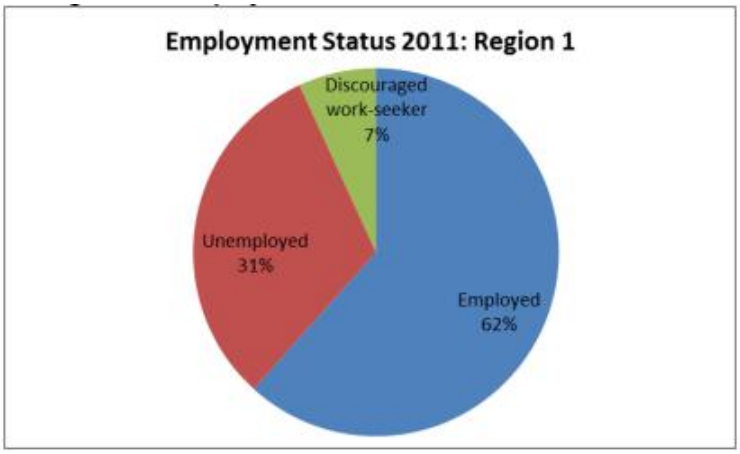
If yes indicate the type of reports below

Ecological Opinion/Scan & Wetland Delineation for Leage La Tlhago (Pty) Ltd for the proposed piggery expansion on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria, Gauteng
Natural Scientific Services (NSS), 2016
Appendix G

9. SOCIO-ECONOMIC CONTEXT

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

Legae La Tlhago is located in Ward 24 in Winterveldt, which falls within Region 1 of the City of Tshwane's (CoT) Metropolitan. The northern section of the region includes the Klipkruisfontein, Ga-Rankuwa, Mabopane, Soshanguve and Winterveldt areas. This northern section of the region accounts for one third of the city's population located in low-income settlements, as stated in the CoT's Region 1: Regional Integrated Development Plan 2014-2015. Unemployment is also a challenging factor in this region, where according to this 14/15 IDP, approximately 31% of the population is unemployed, making this number higher than the national average.



(Source: StatSA Census 2011)

Factors that may be contributing to this status are accounted to relatively low education levels and the lack of access to opportunity. According to the CoT IDP of 2011-2016, Winterveldt municipality's unemployment rate is approximately 14.8%; regarded as the lowest unemployment rate compared to the other Gauteng metropolitan municipalities' rate. Approximately 14% and 15.5% males and females, respectively, are unemployed, with this percentage largely dominated by the black population group with 18% unemployment. The economy of the CoT is driven by industrial development and remains to be the largest economic contributor of this metropolitan. Legae La Tlhago has thus identified an opportunity as the proposed piggery expansion will add great socio-economic value to the pork industry in the area, to the consumer, the business, and to allow local employment opportunities, as well as contributing greatly to the farming industry of South Africa. This opportunity is an outcome of the identified gap in the market, where as a result of some of the redistributed farms not being able to maintain production rates that were seen in the past, and also the increased demand in meat as a result of high protein consumption to satisfy certain dietary requirements. The current operations of the business supply pork and vegetables to local stores and supermarkets, and with the proposed expansion, the company aims to supply major supermarkets and butcheries within the Mabopane, Soshanguve, Ga-Rankuwa and the Tshwane Market. Local butcheries have been approached as they have shown great interest in developing agriculture in South Africa. The business therefore aims to assist in addressing the unemployment challenges in the area, restore dignity of farm workers in the long run, as well as demonstrate the significant role that the youth could contribute in agriculture.

The table below highlights the anticipated socio-economic values associated with the project:

Anticipated CAPEX value of the project on completion	Approximately R2.5 million
What is the expected annual income to be generated by or as a result of the project?	Approximately R450 000
New skilled employment opportunities created in the construction phase of the project	Bricklaying, Welding and power tools operations (approximately 2 + 1 supervisor - number will

	depend on the contractors executing the work)
New skilled employment opportunities created in the operational phase of the project	1 part-time multi-skilled labour for electrical and mechanical work 1 Farm manager 1 piggery supervisor + 1 crops supervisor
New un-skilled employment opportunities created in the construction phase of the project	General labour (approximately 6 - quantity dependent on the contractors executing work)
New un-skilled employment opportunities created in the operational phase of the project	8 General Labour 10 Seasonal workers for vegetables.
What is the expected value of the employment opportunities during the operational and construction phase?	R450 000 per annum for operational (Current Value) R250 000 for construction
What percentage of this value that will accrue to previously disadvantaged individuals?	80% of construction phase 100 % of operational phase
What percentage of this value that will accrue to previously disadvantaged individuals?	Same as above
The expected current value of the employment opportunities during the first 10 years	R4.5 million
What percentage of this value that will accrue to previously disadvantaged individuals?	100%

10. CULTURAL/HISTORICAL FEATURES

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

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

(i) exceeding 5 000 m2 in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m2 in extent; or

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

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

N/A

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

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

N/A

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 attached the comments from SAHRA in the appropriate Appendix	

Note from CSIR: **A heritage screening was submitted to South African Heritage Resources Agency (SAHRA) via the SAHRIS portal (Case ID 9784) and the projected was exempted from undertaking an archaeological and paleontological study, for which they are the competent authority. The Provincial Heritage Resources Authority Gauteng (PHRAG) was also informed about the proposed development and provided an opportunity to comment during the first round of Public Participation. A letter from PHRAG in response to the BID is included in Appendix F, in which a consideration of heritage resources was requested by PHRAG. A heritage specialist, ASHA Consulting, was appointed to comment on the sensitivity of heritage resources on site. A letter from ASHA Consulting has been included in Appendix F, which provides a motivation to exempt the proposed project from undertaking a Heritage Impact Assessment, as it is the opinion of the Specialist that no heritage resources would be impacted by the proposed project. A response from PHRAG has not been received at the time of release of this final report, follow-up enquiries have been sent to PHRAG as well as a request that a response in this regard be forwarded to GDARD as well.**

SECTION C: PUBLIC PARTICIPATION

1. THE ENVIRONMENTAL ASSESSMENT PRACTITIONER MUST CONDUCT PUBLIC PARTICIPATION PROCESS IN ACCORDANCE WITH THE REQUIREMENT OF THE EIA REGULATIONS, 2014.

2. LOCAL AUTHORITY PARTICIPATION

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

Was the draft report submitted to the local authority for comment? NO
The draft report will be submitted to the local authority for comment during the 30-day reviewing Process (the current stage of the project).

If yes, has any comments been received from the local authority? NO
It is anticipated that comments will be received during the 30-day reviewing Process (the current stage).

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

This Draft report is hereby released for a 30-day commenting period. The comments will be incorporated into the final BA Report which will be submitted to GDARD for decision-making.

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

The Draft BAR is only released now and will be submitted to the local authority for comment.

3. CONSULTATION WITH OTHER STAKEHOLDERS

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

Has any comment been received from stakeholders? YES

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

Comments were received in response to the circulation of the Background Information Document and are as follow:

Comment 1: Received from Victoria Bota (South African National Roads Agency (SANRAL)) on the 12th April 2016 stated that SANRAL will not be affected by the proposed development as no National Road will be affected. They also requested to be removed from the mailing list for this project.

Comment 2: Department of Agriculture Forestry and Fisheries (DAFF), Directorate of Land Use and Soil Management acknowledged receipt of proposed project application documents on 22 April 2016 and 07 June 2016 and another email was received from Ms Mavis Hlamalani Mashele (DAFF Resource Auditor) on the 23rd June 2016. A concern was raised that debushing might lead to soil erosion, and that she would like to visit the site.

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

N/A

4. GENERAL PUBLIC PARTICIPATION REQUIREMENTS

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

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

5. APPENDICES FOR PUBLIC PARTICIPATION

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

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

SECTION D: RESOURCE USE AND PROCESS DETAILS

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

Instructions for completion of Section D for alternatives

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

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

Section D Alternative No. | "insert alternative number" | (complete only when appropriate for above)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

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

If yes, what estimated quantity will be produced per month? $10m^3$

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

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

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

Waste will be disposed of at an appropriate licenced landfill site, possibly the Ga-Rankuwa Landfill Site in Ga-Rankuwa which is the nearest landfill site to dispose of building rubble.

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

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

Pig waste = $48m^3$

Other waste = $1.4m^3$

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

Solid waste generated during the operational phase will be stored in suitable bins and transported to the nearest licenced disposal site. Medical waste such as needles will be disposed of through existing medical waste streams in the area. Pig waste will be stored in the slurry dam and used as fertilizer in the agricultural activities on site.

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

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

All waste generated, except for pig waste, will always be disposed of at a registered disposal site.

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

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

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

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

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

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

The suspended solid pig waste will be collected and stored on a concrete surface and composted. It will then be subjected to the aerobic process for two weeks to reduce its odour and moisture. The solid waste will thereafter be recycled and used to fertilise the soils of the vegetable crops in the farm. Recyclable waste such as plastic, glass, paper etc will be taken to the nearest recycling warehouse.

Liquid effluent (other than domestic sewage)

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

Will the activity produce any effluent that will be treated and/or disposed of on site?	Yes
If yes, what estimated quantity will be produced per month?	48m^3

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

The pig waste will fall through the slatted floor, and will be temporarily stored under the slatted floor in a waste holding pit until it is flushed through an enclosed gutter conveying it to a concrete slurry dam. The waste dam will always have water covering the solid waste allowed to settle at the bottom of the slurry dam to trap the smell. As the solids fill the lagoon, the clear water on top will overflow into the overflow dam where it will be disinfected and pumped back to the piggery for cleaning purposes. The solids will be composted and applied to the agricultural field and a fraction of the waste water which will not be used for cleaning purposes will also be irrigated onto the vegetables. These practices will be in accordance with the recommendations of Section 21 (e) of the National Water Act The use of waste water for agricultural purposes is in accordance with the Department of Water Affairs' recognition of waste water as a valuable resource for use as a fertilizer.

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

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

If yes, provide the particulars of the facility:

Facility name:	N/A		
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:

Pig waste together with the water used to wash down the pig housing units will be directed to the slurry dam. As the solids fill the dam the clearer water on top will overflow into the overflow lagoon and pumped back and irrigated onto the vegetable field and some of it will be disinfected and used for cleaning the piggery.

Liquid effluent (domestic sewage)

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

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

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

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:

Emissions from the proposed expansion of a piggery will include dust from vehicles using the gravel access road; this will however be minimal as the proposed development will not result in a significant increase of traffic. Dust will also be as a result of preparing the land and/or due to construction. Emissions will also include odour from the piggery waste and may cause a nuisance to the receptors. Piggery odours occur as a result of anaerobic metabolic processes that occur in slurry dam and the proposed dam will always have water covering the solid waste that will settle at the bottom of the dam in an effort to trap the smell. Considering the proposed measure to minimise pig waste odour and the fact that the piggery is an existing facility which is located in a rural area with very few and sparsely distributed dwellers, it is unlikely that new concerns regarding odour of the proposed upgrade and expansion will be raised. It should also be noted that the odour from piggeries does not constitute an air quality emission, it is however considered and not underestimated as a nuisance and possible impact on the quality of life.

2. WATER USE

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

	groundwater		other	

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: 1 500 kilolitres

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

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

If yes, list the permits required

The proposed activity will require the use of approximately 50 kilolitres per day to be obtained from ground water sources and an existing tank. Water requirements will incorporate domestic water use, water to be used by pigs and possibly water to wash the pig houses. Therefore a water use licence is required for the facility as it triggers Section 21(a) and (b) of the National Water Act 36 of 1998 (NWA). The proposed activity will also require a water use licence in terms of Section 21(e) of the NWA. The Schedule provides: ''general authorisation which replaces the need for a water user to apply for a licence in terms of the Act, provided that the water use is within the limits and conditions as set out in this general authorization.'' The use of biodegradable wastewater, such as that

proposed for Legae La Tlhago on agricultural land, is part of a general authorization regarded as a Controlled Water Use Activity, provided that the activity complies with the conditions specified in Government Notice No. 665 of 6 September 2013 (National Water Act, Act 36 of 1998).

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

3. POWER SUPPLY

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

Renewable energy source (Solar panels), plans to look into Eskom power supply.

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

N/A

4. ENERGY EFFICIENCY

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

Solar powered panels are currently utilized at the farm for lighting. Legae La Tlhago plans to install more solar panels for lighting and powering of pumps for the borehole and lagoon. This could assist the piggery to be self-sustainable in terms of electricity, to reduce the need to rely on Eskom or in the case that Eskom does not supply power to the plot. The farm will make use of energy efficient light bulbs for lighting.

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

None

SECTION E: IMPACT ASSESSMENT

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

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summarise the issues raised by interested and affected parties.

Issues raised by Interested and Affected Parties following the release of the Background Information Document released on the 08th April 2016, prior to the release of the Draft Basic Assessment Report. and post Draft BA:

Ms Mavis Hlamalani Mashele (DAFF Resource Auditor) on the 23rd June 2016

- As CARA administrator, during debushing in order to extend the piggery facility the might be soil erosion. I will also prefer to visit the site.

Summary of response from the practitioner to the issues raised by the interested and affected parties (including the manner in which the public comments are incorporated or why they were not included).

(A full response must be provided in the Comments and Response Report that must be attached to this report):

The erosion potential for the site has been addressed in the Ecological Report attached as Appendix G. According to this report, the potential is of low significance when mitigation and management actions are implemented. A full response to this comment is also provided in the Comments and Responses Report included in the attached Appendix E.

2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASE

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

APPROACH TO THE BASIC ASSESSMENT

1) METHODOLOGY OF IMPACT ASSESSMENT

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

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

2) SPECIALIST CRITERIA FOR IMPACT ASSESSMENT

The following methodology has been provided by the CSIR to the specialist who conducted the Ecological assessment, NSS, for incorporation into their specialist assessment:

Assessment of Potential Impacts

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

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

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

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

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

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

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

Irreplaceability - this reviews the extent to which an environmental resource is replaceable or irreplaceable. For example, if the proposed project will be undertaken on land that is already transformed and degraded, this will yield a low irreplaceability score; however, should a proposed development destroy unique wetland systems for

example, these may be considered irreplaceable and thus be described as high. The assessment of the degree to which the impact causes irreplaceable loss of resources is based on the following terms:

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

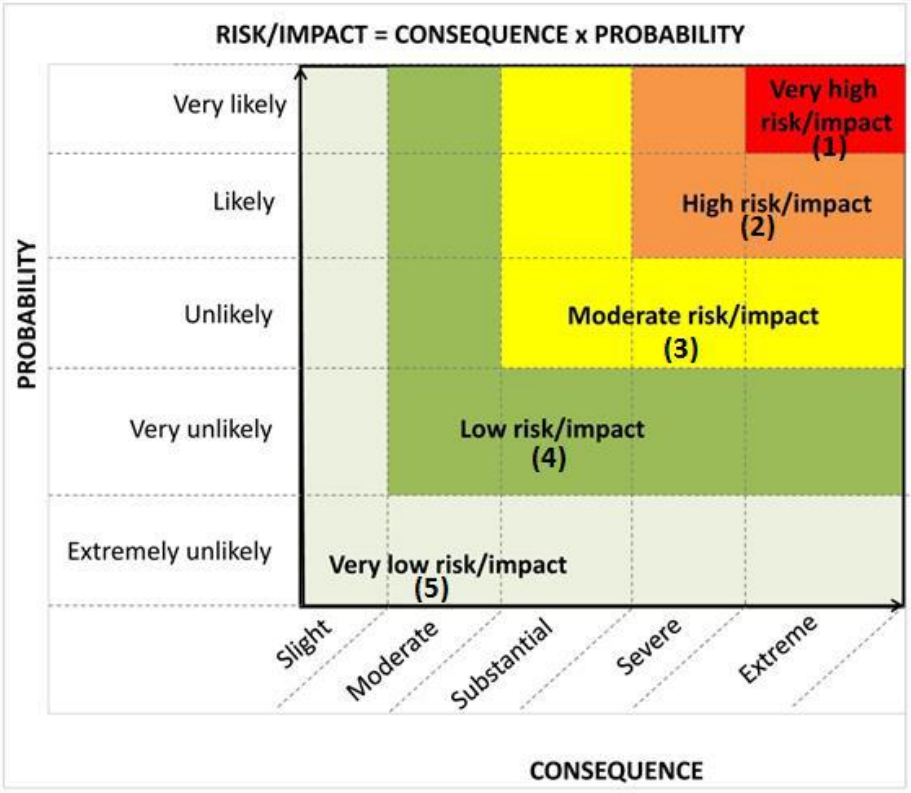


Figure 2-1: Guide to assessing risk/impact significance as a result of consequence and probability.

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

Status of the impact: A description as to whether the impact will be:

- Positive (environment overall benefits from impact);
- Negative (environment overall adversely affected); or
- Neutral (environment overall not affected).

Degree of confidence in predictions: The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as:

- High;
- Medium; or
- Low.

Based on the above considerations, the specialist provides an overall evaluation of the significance of the potential impact, which should be described as follows:

- **Low to very low:** the impact may result in minor alterations of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated;

- **Medium:** the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated; or
- **High:** Where it could have a "no-go" implication for the project unless mitigation or re-design is practically achievable.

Furthermore, the following must be considered:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the construction, operation and decommissioning phases of the project, where relevant.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.

Management Actions:

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

Monitoring:

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

Cumulative Impact:

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

Mitigation:

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

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

Note from the CSIR: Feasible alternatives (i.e. location, activity and property alternatives) do not exist for the proposed project as this is the only land parcel that the owners were able to acquire, and it would not be economically feasible for the business to find and or purchase new property. Environmental impacts would be significantly higher if a new facility were to be established compared to expanding an existing facility. The piggery is an existing operation on site and therefore an alternative activity has not been assessed or identified. It would not be economically feasible or practical for the applicant to embark on a different activity on the site. The No-Go alternative will be considered.

PROPOSAL

Table 2-1: Impacts associated with the proposed piggery expansion of Legae La Tlhago

CONSTRUCTION PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
PROPOSAL (preferred alternative)												
Direct Impacts												
• Loss of vegetation and faunal habitat.	Site specific	Long term	Substantial	Very likely	Moderate	Moderate	Medium (Negative)	High	No	Yes	- Development planning must ensure loss of vegetation and disturbance is restricted to within the recommended expansion site layout footprint. - Clearly demarcate or fence in the construction site. Relocate specimens that are situated in the construction footprint, according to the advice of an appropriate specialist. - Development must be planned for areas that are already transformed. - Identify and mark indigenous trees on the ground. Those that are small and cannot be avoided should be transplanted elsewhere on site.	Low
• Loss of Conservation Important (CI) or medicinally important flora.	Site specific	Long term	Substantial	Likely	Moderate	Moderate	Medium (Negative)	High	Yes	Yes	- Development planning to be restricted to already disturbed or transformed areas as far as possible, as per the recommended site layout. - If removing CI species such as the Protected Marulas or stapeliads then submit permits for their removal. - Prior to construction any CI and medicinally important floral specimens that may occur within the site layout footprint (areas zoned for the piggery, effluent dam, orchard or cropland) should be collected and replanted in the surrounding areas.	Low
• Introduction and increase in alien vegetation.	Local	Long term	Moderate	Very likely	Low	Low	Low (Negative)	High	No	Yes	- Ensure that alien invasive species are identified on site. - Regulate / limit access by potential vectors of alien plants. - Alien invasive species identified on site should be removed prior to construction. - Manual or mechanical removal should be done as opposed to chemical removal. - Carefully regulate / limit access by vehicles and materials to the construction site. Demarcate or fence in the construction area. - By law, remove and dispose of Category 1b	Low

CONSTRUCTION PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											alien species on site. All Category 2 species that remain on site must require a permit. - Prohibit the introduction of domestic animals such as dogs and cats.	
• Loss and displacement of fauna on site.	Site specific	Short term	Moderate	Very likely	Moderate	Moderate	Low (Negative)	High	No	Yes	- Areas of sensitive fauna to be avoided in the layout plan for the proposed development. - If any of the remaining natural areas are to be affected, adhere to law and best practice guidelines regarding the handling and relocation of CI fauna. - It is recommended that a suitably qualified specialist be assigned to relocate any CI fauna on site to nearby suitable habitat (i.e. *Termitaria* that need to be destroyed within the project footprint should be carefully searched for Striped Harlequin Snakes and night time searches for hedgehogs and bullfrogs should be performed).	Low
• Loss of wetlands.	Local	Long term	Severe	Very likely	Moderate	Moderate	High (Negative)	High	Yes	Yes	- Development planning to re-align area set aside for piggery expansion to avoid the wetland and associated wetland buffer, as per the specialists' recommendation. - Re-align the proposed piggery expansion in a north-easterly/south-westerly direction as opposed to the easterly direction proposed. - No construction should be planned within the sensitive environment (wetlands).	Low
• Increased use of electricity and groundwater during construction activities.	Local	Long term	Substantial	Likely	Non-reversible	Moderate	Medium (Negative)	High	No	Yes	- Minimise electricity use to only when necessary and make use of renewable energy as a source of electricity. - Regular inspection and maintenance of all boreholes, tanks, reservoirs, toilets, water pipes, valves and taps should be conducted, to prevent wasting water. - Apply water saving techniques, such as re-use of water.	Low
• Sensory disturbance of fauna due to noise.	Local	Long term	Moderate	Likely	Low	Low	Low (Negative)	High	No	Yes	- Limit construction activities to day time hours. - Minimize or eliminate security and construction lighting, to reduce the disturbance of nocturnal fauna. - All outside lighting should be directed away from sensitive areas. - Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least.	Low

CONSTRUCTION PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											- Minimize noise to limit its impact on sensitive fauna such as potentially occurring owls, korhaans and secretary birds.	
• Possible soil and water contamination due to temporary fuel storage on site.	Local	Long term	Substantial	Likely	Non-reversible	Moderate	Medium (Negative)	Low	Yes	Yes	- Hazardous chemicals and materials to be stored in a designated area. - Ensure that any spilled fuel is effectively cleaned using the appropriate products.	Low
• Soil and surface water pollution as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	Local	Long term	Substantial	Likely	Non-reversible	Moderate	Medium (Negative)	Low	Yes	Yes	- Mixing of cement or concrete must not take place on the soil surface, to be undertaken on designated areas. - Establish appropriate emergency procedures for accidental contamination of the surroundings.	Low
• Construction activities may disturb or destroy sites or features of heritage importance.	Site specific	Permanent	Severe	Very unlikely	Non-reversible	High	Low (Negative)	Medium	Yes	Yes	- Should any features of heritage be identified on site, these should not be disturbed and would be immediately reported to a Heritage specialist and Gauteng Heritage Resources Authority.	Low
• Potential deterioration of the existing gravel road due to use by heavy construction vehicles.	Local	Short term	Substantial	Likely	Moderate	Low	Medium (Negative)	Medium	No	Yes	- Limit vehicles coming to the site and limit to a temporary minimal duration. - Maintain and/or upgrade the gravel road.	Medium
• Potential impact of traffic.	Local	Short term	Substantial	Likely	Moderate	Low	Medium (Negative)	Medium	No	Yes	- Effective signage and traffic control measures along the route.	Low
• Generation of construction waste.	Site specific	Short term	Substantial	Very likely	High	Low	Medium (Negative)	High	No	Yes	- Any waste generated during construction must be stored in such a manner that it prevents pollution and amenity impacts.	Low
• Potential of soil erosion due to exposed soil.	Local	Long term	Substantial	Likely	Moderate	Low	Medium (Negative)	Medium	No	Yes	- Limit vehicles, people and materials to the construction site. - Construction to preferably be undertaken in winter, when there is minimal risk of erosion. - Revegetate denude area with indigenous flora as soon as possible - Implement erosion protection measures on site to reduce erosion and sedimentation of downstream Kutswane River. Measures could include bunding around soil stockpiles, and vegetation of areas not to be developed. - Take action before erosion develops to a large scale. - Limit vegetation removal to only the	Low

CONSTRUCTION PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											construction area, avoid disturbance to other areas.	
• Degradation of ambient air quality as a result of dust and other emissions generated.	Local	Long term	Substantial	Likely	Moderate	Low	Medium (Negative)	Medium	No	Yes	- Exposed areas should be re-vegetated with locally indigenous flora. If the soil is compacted, it should be ripped, and fertilised. - Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road. - A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.	Low
• Noise disturbances as a result of construction activities.	Local	Long term	Substantial	Likely	Moderate	Low	Medium (Negative)	Medium	No	Yes	- Activities that will generate the most noise should be limited to during the day in order minimise disturbance to the neighbours. - The noise created by the proposed development is not expected to be problematic. If required, noise reduction measures will have to be implemented in compliance with the Gauteng Noise Regulations. - No sound amplification equipment to be used on site, except in emergency situations. - Limit vehicles travelling to and from the site to minimise traffic noise to the surrounding environment. - A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.	Low
Indirect Impacts												
• The creation of new employment opportunities and skills development.	Municipal Area	Short term	Substantial	Very likely	High	High	Medium (Positive)	Medium	No	**Yes**	- Ensure maximisation of job creation and promote local employment and skills training.	High
NO-GO ALTERNATIVE												
DIRECT IMPACTS: - None of the impacts mentioned above will occur. - The site will remain with existing structures, no new clearance will occur which will result in no clearance of indigenous vegetation and no clearance of present alien species. - Customers of the proposed pig and vegetable facility will not be provided with an increase of produce and pork products on a local scale.												

CONSTRUCTION PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
INDIRECT IMPACTS: - There are no indirect impacts during the construction phase for the No-go Option. - If the proposed project does not proceed, increased income and economic benefits associated with the expansion will not be realised. - No new employment opportunities will be created. - If the proposed project does not proceed, the local industries that rely on the supply of pork could experience hindered economic growth potential.												

OPERATIONAL PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
PROPOSAL (preferred alternative)												
Direct Impacts												
• Deterioration of water quality and impact on downstream aquatic ecology.	Regional	Long term	Severe	Likely	Low	Moderate	High (Negative)	Low	Yes	Yes	- Pig housing must have slatted floors which collect waste and conduct it through enclosed concrete canals. - Pig waste must be stored in an enclosed concrete waste storage. - The application of the liquid waste onto the agricultural field must adhere to the Water Act legislation and Water Use Licence permit. - The use of solid waste as compost on the agricultural field must adhere to Waste Act and Waste Management Licence terms. - Hazardous waste must be stored in suitable containers and disposed of accordingly.	Low
• Impact on sensitive areas such as the wetland and sensitive flora.	Local	Long term	Substantial	Likely	Non-reversible	High	Medium (Negative)	Medium	Yes	Yes	- Limit human activity on areas that are close to sensitive sites. - Piggery activities must be undertaken away from these areas and associated buffers.	Low
• Impact on ambient air quality from piggery emissions and odour.	Local	Long term	Severe	Very likely	Non-reversible	High	High (Negative)	Medium	No	Yes	- Cover the waste dams to reduce the odour. - Piggery must be kept clean as far as possible to minimise odour emissions, regularly flush housing units. - Implement best practices in terms of waste regulation of the dam and practice good housekeeping of the pig housing units. Avoiding unnecessary build-up of waste in the housing units and dams. - Ensure sufficient ventilation of the housing units. - Subject the pig solid waste to the aerobic	Medium

OPERATIONAL PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											process to reduce its odour.	
• Impact of dust and vehicle emissions generated during use of the gravel road when transporting pigs and vegetables during operation.	Local	Long term	Moderate	Unlikely	Non-reversible	Moderate	Low (Negative)	Medium	No	Yes	- Vehicles transporting to and from the farm must keep at minimum speed to reduce dust generation. - Vehicles that are used must be roadworthy and regularly inspected in order to prevent unwanted emissions. - Traffic dust will be minimal considering that the piggery will make use of one vehicle thus no significant increase in traffic.	Low
• Impact on biosecurity and transmission of diseases.	Local	Long term	Severe	Likely	Moderate	Low	High (Negative)	Medium	Yes	Yes	- Training of workers to effectively handle sick and dead animals. - Ensure effective pest management measures. - Regularly clean the piggery to minimise influx of pests. - Dead pigs must be removed from the facility as soon as possible, at all times. - Restrict piggery access and use disinfectant sprays on vehicles and personnel entering the site. - Feeding areas must be regularly cleaned to prevent the attraction of flies. - Piggery must have security fencing around it to prevent access of other animals such as dogs.	Low
• Potential injury to employees working with biological waste and Potential for workers' safety being compromised due to handling hazardous material and biomedical substances.	Site specific	Very short term	Substantial	Likely	Non-reversible	Moderate	Medium (Negative	Medium	Yes	Yes	- Biological waste such as syringes must be collected and disposed of in a responsible, appropriate manner; preferably through the assistance of a veterinarian. - Training of workers to safely store biological equipment. - Worker to wear Personal Protective Equipment (PPE). - Hazardous material must be correctly labelled and handled in a safe manner.	Low
• Impact on groundwater due to use and spillage of chemicals on site, such as disinfectants.	Regional	Long term	Substantial	Likely	Low	Moderate	Medium (Negative)	Low	Yes	Yes	- Chemicals must be used in the recommended amount and area, and stored in a designated area. These areas must be regularly monitored. - In the event of spills, the area to be cleaned immediately using bioremediation products. - Ensure that any accidental spills do not move beyond the designated storage area.	Low
• Increased water usage due to abstraction from the borehole for water requirements of the facility.	Local	Long term	Substantial	Likely	Non-reversible	High	Medium (Negative)	Medium	No	Yes	- Water saving strategies should be practiced such as re-use and raising water conservation awareness. - Create awareness on the importance of these resources and implement energy and water saving mechanisms.	Low

OPERATIONAL PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											- Also make use of rain water from the existing tank to minimise abstraction demands. - Make use of renewable energy. - Prevent wasting of water such as leaving running taps. - Regular inspection of use should be conducted, including regular inspection of the borehole, water tanks, for any leaks.	
• Impact on natural vegetation during operational activities.	Site	Long term	Substantial	Likely	Non-reversible	High	Medium (Negative)	Medium	Yes	Yes	- Activities should be restricted to already transformed areas. - Existing site entrance should be used to reduce impact on natural vegetation.	Low
• Reduction in Conservation Important species (Harvesting of CI or medicinal flora).	Local	Long term	Moderate	Likely	Non-reversible	High	Low (Negative)	Medium	Yes	Yes	- Prohibit harvesting of CI, medicinal species and other indigenous flora.	Low
• Introduction and spread of alien species.	Local	Long term	Severe	Likely	Low	Moderate	High (Negative)	High	No	Yes	- Control or limit access by potential vectors of alien plants. - Remove and dispose of Category 1b alien species on site and obtain permit to remove Category 2 species on site. - Manual or mechanical removal of alien invasives should be done as opposed to chemical removal. - Carefully regulate / limit access by vehicles and materials to the site. - By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit. - Prohibit the introduction of domestic animals such as dogs and cats.	Low
• Impact of operational activities on fauna.	Local	Long term	Substantial	Likely	Low	Moderate	Medium (Negative)	High	No	Yes	- Minimize or eliminate lighting, to reduce the disturbance of nocturnal fauna. - All outside lighting should be directed away from sensitive areas. - Minimize noise to limit its impact on sensitive fauna such as potentially occurring owls, korhaans and secretary birds. - Create awareness on the importance of fauna and ecosystem functioning.	Low
• Potential for fires to occur.	Local	Long term	Substantial	Likely	Moderate	Low	Medium (Negative)	High	Yes	Yes	- Ensure effective fire management plans. - 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. - Maintain an effective fire break between the development area and the surrounding	Low

OPERATIONAL PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
											natural environment (especially the ridge to the north, where the fire-dependent Highveld Blue butterfly may occur). - Educate workers about the plan and emergency procedures with regular training and notices.	
• Noise from operational activities and pig sounds (squealing) throughout the farming process.	Local	Long term	Moderate	Very likely	Low	Moderate	Low (Negative)	High	No	Yes	- Activities that generate the most noise to be limited to during the day. - No sound amplification equipment to be used on site, except in emergency situations. - Limit vehicles travelling to and from the site to minimise traffic noise to the surrounding environment - Avoid unnecessary disturbance of the pigs, to prevent excessive noise from the pigs.	Low
• Possible soil and water contamination from diesel storage on site.	Local	Long term	Substantial	Likely	Low	Moderate	Medium (Negative)	Low	Yes	Yes	- Appropriate storage of hazardous material such as diesel must be implemented. - Fuel must be stored in a secure designated room. - The ground where refuelling takes place must be protected and refuelling to be handled in a cautious manner. - In the event of spills, the area to be cleaned immediately using bioremediation products. - Ensure that any accidental spills do not move beyond the designated storage area. - Ensure appropriate and safe disposal of hazardous chemicals. - Ensure training of staff to handle hazardous chemicals.	Low
• Generation of operational waste.	Regional	Long term	Substantial	Very likely	Low	Moderate	Medium (Negative)	Low	No	Yes	- All waste produced to be disposed of in permitted designated waste disposal site. - Waste must be stored in designated areas for storage. - Clearly demarcate appropriate storage for the different types of waste. - Ensure regular removal of waste on site to prevent attraction of pests and disposal of waste in a permitted disposal site.	Low
• Potential impact of traffic.	Local	Long term	Substantial	Likely	Low	Moderate	Medium (Negative)	Medium	Yes	Yes	- Limit the amount of vehicles using this route. - Traffic impact will be minimal considering that the piggery will make use of one vehicle thus no significant increase in traffic.	Low
• Potential impact on heritage resources.	Local	Long term	Substantial	Very unlikely	Non-reversible	High	Low (Negative)	High	Yes	Yes	- The site does not have any heritage resources, however should any archaeological features be discovered on site then a qualified Heritage specialist and SAHRA will be notified.	Low

OPERATIONAL PHASE												
Potential Impact Description	**Extent**	**Duration**	**Consequence**	**Probability**	**Reversibility**	**Irreplaceability**	**Significance Rating (Positive or Negative)**	**Degree of Confidence**	**Can impact be avoided?**	**Can impact be managed or mitigated?**	**Proposed Mitigation**	**Significance Rating after Mitigation**
Indirect Impacts												
• The proposed expansion has the potential to create local employment and skill development.	Local	Long term	Substantial	Very likely	High	High	Medium (Positive)	Medium	Yes	Yes	- Maximise job creation and promote local employment and skills training.	High
• The proposed project will contribute to the local economic market through the supply of pork to local butcheries.	Local	Long term	Substantial	Likely	High	High	Medium (Positive)	Medium	Yes	Yes	- Ensure that local butcheries are utilized as consumers.	High

NO-GO ALTERNATIVE	
Potential Impact Description	**Significance Rating (Positive or Negative)**
Direct Impacts	
• Potential impact on vegetation and faunal habitats.	No impact
• Impact on soil erosion and dust.	No impact
• Impact on water quality and downstream aquatic ecology.	High (Negative) – Existing piggery and with the current system effluents may impact downstream water quality
• Potential for groundwater impact.	High (Negative) – Existing piggery and current practices have the potential to impact groundwater, waste effluent contained in concrete dam.
• Air quality impact.	High (Negative) – Existing piggery, the status quo will continue with regards to odour from piggery and dust generated by farm vehicles.
• Waste generation.	Low (Negative) – Existing piggery, any impact created in construction has already occurred.
Indirect Impacts	
• If the proposed project does not proceed, increased income and economic benefits associated with the expansion will not be realised. • No new employment opportunities will be created. • If the proposed project does not proceed, the local industries that rely on the supply of pork could experience hindered economic growth potential.	

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

Ecological Opinion/Scan & Wetland Delineation for Leage La Tlhago (Pty) Ltd for the proposed piggery expansion on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria, Gauteng NSS, 2016 Appendix G

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

Uncertainties form part of any proposed development with regards to the actual degree of impact that the development will have on the immediate environment. Any actual and/or site specific results will only be determined once development has commenced and throughout the life cycle of the proposed project. 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 close to the end of the growing season). At the end of summer many species have died back and retracted making it difficult to confirm identification. The 2015/2016 season also experienced below average rainfall in the beginning of the season. • 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.

3. IMPACTS THAT MAY RESULT FROM THE DECOMISSIONING AND CLOSURE PHASE

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

Note from the CSIR: Decommissioning and/or closure phase is not expected to occur for the proposed piggery. Should there be plans to close down the piggery; a closure plan will be submitted to the competent authority for approval and it will comply to the relevant legislation at the time of closure.

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

Ecological Opinion/Scan & Wetland Delineation for Leage La Tlhago (Pty) Ltd for the proposed piggery expansion on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria, Gauteng NSS, 2016 Appendix G

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

N/A

4. CUMULATIVE IMPACTS

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

Vehicles transporting material to and from the site will potentially increase traffic load along the internal gravel access road passing through the Mmakaunyana village and potentially add to the noise and dust level to the nearby village and residents. Potential exists for additional traffic during the construction phase, this is however of a temporal duration and impact. Currently the transporting of pigs makes use of one van and the proposed expansion will not result in significant increase of traffic along this road as the business plans to purchase one truck for the safe transportation of pigs and vegetables.

The surrounding area does not have municipal water and therefore relies on extracting water from boreholes and surface water storage. Large amount of abstraction of water from different sources, coupled with water abstraction for this expansion, could result in decreased ground water availability of adjacent properties. This study will however undertake a borehole test to determine water availability in the area and capability to meet the water demand for the piggery expansion. It will also apply water saving strategies such as the re-use of water for cleaning purposes in the facility. It will also make use of surface water stored in the tank for other domestic purposes.

The proposed expansion has the potential to impact the socio economic status of the local area through job creation, skills development and increased pork production for the local market. This impact will not be mitigated as mitigation will not improve the local socio-economic situation.

5. ENVIRONMENTAL IMPACT STATEMENT

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

Proposal

The proposed expansion area is mostly transformed as a result of past agricultural practices and current existing piggery and vegetable farming. The main environmental impacts associated with the proposed project include:

Site preparation and clearance

Site clearance cannot be avoided during the construction phase. This phase will result in exposed soil, which could result in soil erosion and wind-blown dust. Erosion can lead to destruction of natural habitats and sedimentation of nearby watercourses. All reasonable measures need to be implemented to minimise erosion during the construction phase. This impact will however be of temporary duration and have a low probability of occurrence with implemented mitigation measures and ultimately low impact.

Vegetation and habitat loss

Vegetation loss is unavoidable during the construction and operational phase. The majority of the site proposed for the piggery expansion, however, has been transformed and very little natural vegetation remains. Development planning must ensure loss of vegetation and disturbance is restricted to within the recommended expansion site layout. It is not expected that activities associated with the expansion will impact the natural faunal and flora to any significant level.

Waste

Waste will be generated during the construction and operational phase; this will therefore be of permanent duration. There will however be a system to effectively store/contain and remove waste following legal disposal measures. Waste impacts will be of low probability post mitigation and ultimately of low impact with effective

mitigation measures and monitoring. Recycling of waste is also encouraged to reduce impacts as well as reducing the amount of waste incurred by disposal sites.

Socio-economic

The proposed expansion will contribute to the local economy during both the construction and operational phases as local labourers will be employed and the pork produce will also be supplied to local markets. Increased productivity as a result of the impact will lead to the creation of employment opportunities and skills development in the area. The impact will be of temporal nature during the construction phase and permanent for the operational phase. The probability of this impact occurring is high and as such a potential high positive impact.

Based on the environmental assessment presented, it is a conclusion of this Basic Assessment that the proposed project will have relatively low impacts on the environment. With the effective implementation of the management and mitigation measures recommended in this report and those of the specialist report, the significance of most impacts on site from an environmental perspective are considered to be of **low significance.** There will be potential impacts on vegetation and habitat, water quality, soil, dust, and odour as a result of earthworks associated with the activity, influx of vehicles, waste generated by the piggery and pig farming as a whole. As a result of the ecological sensitivities identified on site, it was recommended by the Ecological specialist that the proposed expansion be moved away from the identified sensitive biodiversity features. It is NSS's opinion that based on the brief field scan of the site and on the available information to date, there are no fatal flaws associated with the project and that provided the mitigation set out is adhered to NSS have no objections to the project going forward. This includes moving out of the wetland and associated buffer area as well as not encroaching the *Open Acacia Sandy Bushveld* area. The Environmental Management Programme supporting this BA outlines adequate methods and mitigation measures that need to be implemented in order for the identified impacts to not pose any environmental flaws associated with the proposed upgrading and expansion of the pig farming facility and associated infrastructure.

Alternative 1

N/A

Alternative 2

N/A

No-go (compulsory)

The no-go option would mean that the status quo would remain. Pig production on the farm will not be increased, the current operations will not be altered and the type of technology will still be the same. The piggery will therefore not be able to develop increased profit and increase pork production to supply the pork industry. The opportunity to improve the local socio-economic situation and to use best practice pig farming methods, including improved pig welfare, will not be realised. Waste management, odour and pest control problems associated with the existing piggery will not be improved. Environmental impacts would not be impacted on any further than the current situation. The environmental impacts associated with the proposed expansion are considered to be of an acceptable level and can be effectively managed with the implementation of effective mitigation methods as discussed in the EMPr.

6. IMPACT SUMMARY OF THE PROPOSAL OR PREFERRED ALTERNATIVE

For proposal:

- Impact on soil (erosion and dust)
- Loss of vegetation and faunal habitat
- Impact on Conservation Important species
- Introduction and increase in alien vegetation
- Impact on wetland habitat
- Potential for pollution of water sources
- Waste generation
- Impact of pests and disease transmission
- Impact of traffic
- Employment opportunities created

For alternative:

N/A

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

The proposed development is for the expansion of an existing piggery and all the proposed structures associated with the expansion and/upgrade are designed to follow SAPPOS guidelines in terms of best practices associated with pig farming, and to adhere to environmental legislation advocating minimal environmental impacts. Environmental impacts associated with this development would be exacerbated in establishing a new facility compared to expanding an existing facility located in an area of low environmental impacts, provided that the management methods and/or mitigation measures stipulated in this report are implemented. The proposed layout is also regarded as a biosecurity measure to ensure that there is no unauthorised access to the site and ultimately the piggery, including the entry of other animals, thus preventing the potential of pests and transmission of infectious vectors that could pose a threat to the health of the pigs. The proposed location of the piggery will ensure that development occurs in already transformed land, minimising impact on undisturbed land within the remainder of the farm.

7. SPATIAL DEVELOPMENT TOOLS

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

The Spatial Development Framework (SDF) is the legislated component of the municipality's Integrated Development Plan (IDP) that prescribes development strategies and policy guidelines to restructure and reengineer the urban and rural form. The SDF is the municipality's long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The proposed project has considered and is guided by the Regions SDF and IDP priorities of the area. It aims to empower the local economy, which is individuals and local business in terms of job creation and skills development. The proposed project falls within Region 1 in the City of Tshwane, (Figure below).

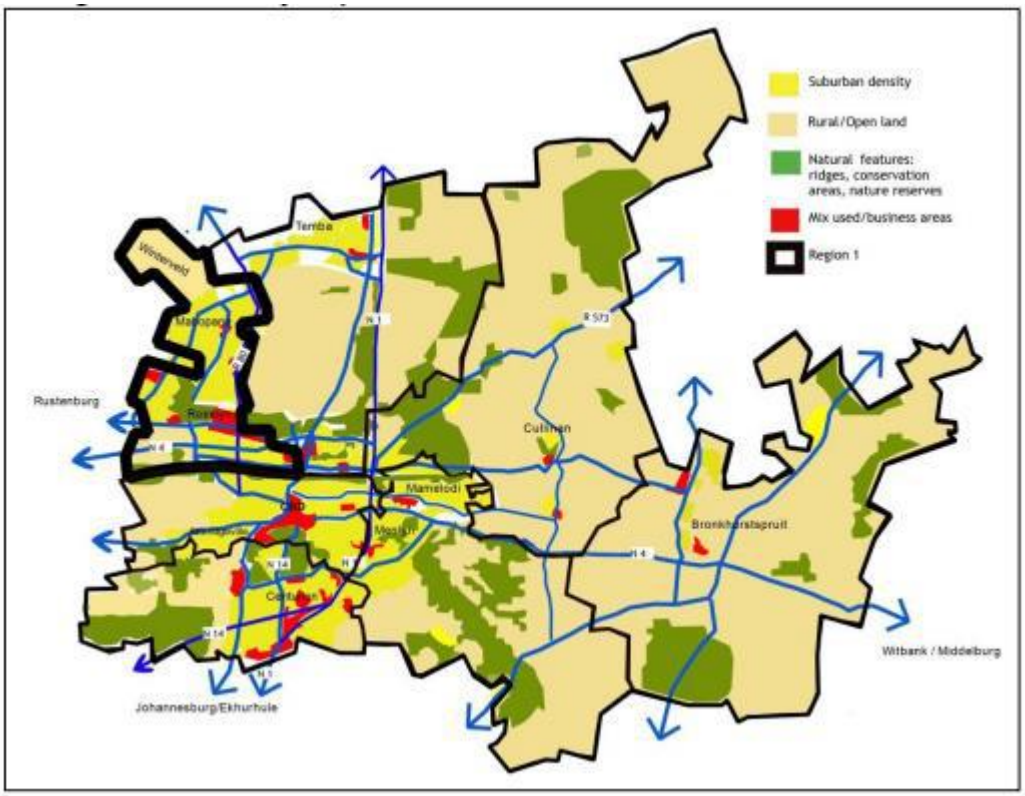


Figure 7-1: The location of Region 1 in the City of Tshwane (Source: Region 1: Regional Integrated Development Plan 2014 - 2015)

The proposed project falls within an area determined as Rural/Open Land, and the SDF's intention is to create vibrant equitable and sustainable rural communities. This can be achieved through food provision as well as providing work opportunities. The figure below indicates the key developmental features of Region 1.

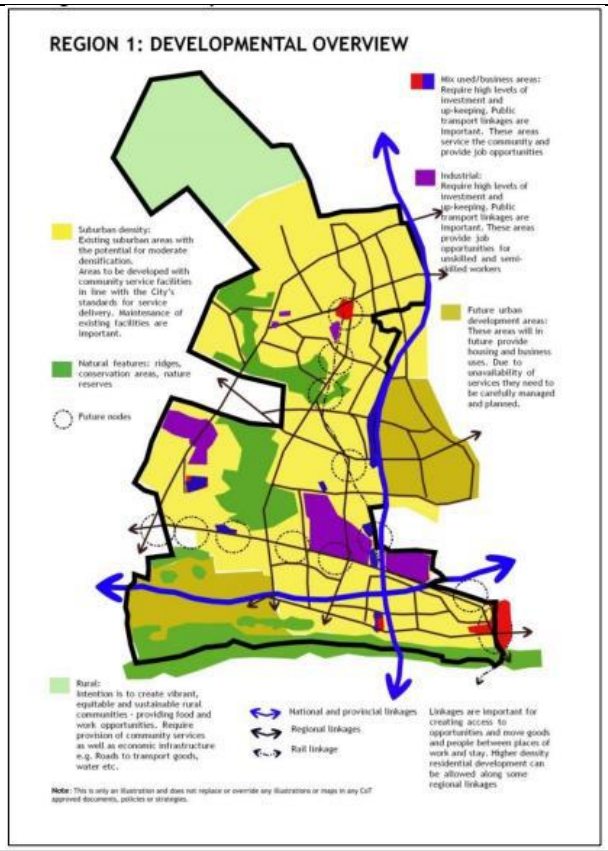


Figure 7-2: Regional Developmental Overview for Region 1 (Source: Region 1: Regional Integrated Development Plan 2014 - 2015)

In terms of the spatial development, some of the weaknesses identified for the region include:

- The region has a very large population with low levels of education, high unemployment and very low income and poor living standards.
- There is a very limited private sector investment within the region and backlogs exist in the provision of services.
- There are very few job opportunities for unskilled labourers.

This 2014-2015 IDP also states that the current socio-economic and development situation in the region, as well as the region's spatial/developmental opportunities, strengths, weaknesses and threats should help inform a service delivery response relevant to the regions conditions and ultimately the City of Tshwane's vision. The proposed project could therefore contribute to the local economic opportunities, ultimately impacting socio-economic development of the area; in support of the region's spatial development opportunities.

8. RECOMMENDATION OF THE PRACTITIONER

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

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

N/A

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

This BAR addresses a detailed analysis of the potential impacts associated with the proposed development project. The proposed development will have an impact of low significance, provided that the mitigation measures proposed in this report and the EMPr are effectively implemented. It is therefore recommended that the proposed project is approved, subject to the following conditions and mitigation measures:

- The EMPr of this proposed development must form part of the contractual agreement and be adhered to by both the contractors and the applicant.
- The recommendations of the specialist, including moving out of the wetland, must be implemented.
- The applicant to ascertain that there is representation of the applicant on site, at all times of the project phases, ensuring compliance with the conditions of the EMPr and Environmental Authorisation thereof.
- A Waste Management Licence must be obtained for the storage of pig waste in the lagoon.
- A Water Use Licence must be obtained for the water usage associated with the piggery operations as well as the re-use of waste water for fertilisation.

It is the opinion of the EAPs that the proposed expansion and/or upgrade will comply with current relevant legislation, and that with the implementation of the mitigation measures suggested in this BAR, there are no environmental impacts identified as highly detrimental to the environment. An ecological specialist study was conducted as part of the BA. The study recommended that the proposed layout be moved outside of areas of sensitivity, i.e. the wetland and buffer area. It is therefore recommended that following the above, the proposed development be granted Environmental Authorisation.

9. THE NEEDS AND DESIRABILITY OF THE PROPOSED DEVELOPMENT (AS PER NOTICE 792 OF 2012, OR THE UPDATED VERSION OF THIS GUIDELINE)

Questions (Notice 792, NEMA, 2012)		Answer
PART I: NEED		
1.	Is the land use associated with the activity being applied for considered within the timeframe intended by the existing approved SDF agreed to be the relevant environmental authority?	Yes. The proposed land use is in line with the City of Tshwane's Regional Spatial Development Framework 2011 – 2016 and Municipal Spatial Development Framework's Strategic Objective 2 of Economic growth and development. As part of this objective, emphasis is also placed on Rural development programmes to improve livelihoods and stimulate employment.
2.	Should the development, or if applicable, expansion of the town/area concerned in terms of this land use occurs here at this point in time?	Yes. The proposed activity will result in optimal use of rural land. According to the Region 1: Regional Integrated Development Plan, 2014-15, the proposed project falls within an area which is demarcated as "rural", and the intention of development in this area is to create vibrant, equitable and sustainable rural development which provides food and work opportunities.
3.	Does the community/area need the activity and the associated land use concerned? This refers to the strategic as well as local level.	Yes. The current operations of the business supply pork and vegetables to local stores and supermarkets, and with the proposed expansion, the company aims to supply major supermarkets and butcheries within the Mabopane, Soshanguve, Ga-Rankuwa and the Tshwane

Questions (Notice 792, NEMA, 2012)		Answer
		Market. Local butcheries have been approached as they have shown great interest in developing agriculture in South Africa. The business therefore aims to assist in addressing the unemployment difficulties in the area, restore dignity of farm workers in the long run, as well as demonstrate the significant role that the youth could contribute in agriculture. This opportunity is expected to be of economic benefit and contribution to the pork industry in the area.
4.	Are the necessary services with adequate capacity currently available (at the time of application) or must additional capacity be created to cater for the development?	Yes. The proposed development can be adequately serviced by the existing infrastructure and planned infrastructure which is not of municipal service. The proposed project will make use of borehole water, for which a water use licence will be applied for, and solar panels as municipal electricity is not available in the area. According to the IDP 2014 – 2015, the city has set a target to ensure that all households have access to electricity in this ward.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of the services and opportunity cost)?	No. The proposed development is not provided for in the infrastructure planning of the municipality as it is a small development of local importance. There is potential for a slight increase in terms of electricity, but this would be minimal as the operation is already using solar panels for lighting. It is a small operation and will therefore not impact greatly to municipal services should the area be provided with electricity. Therefore, the proposed project will not have major implications for the infrastructure planning.
6.	Is the project part of a national programme to address an issue of national concern or importance?	Although this project draws from no specific objectives of the National Development Plan of South Africa, the proposed piggery production would however contribute to the country's collective objective of promoting sustainable food security. With this contribution to small and medium sized agricultural initiatives in the area, it is hoped to result in growing of the pig farming industry in the area, resulting in the growth of jobs and the growth of the area's economic base resulting in poverty alleviation. The proposed project will also have a positive contribution towards food safety and security in South Africa.
PART II: DESIRABILITY		
1.	Is the development the best practicable environmental option for this land/site?	Yes. The proposed development is for an expansion of an existing land use in the form of a piggery and vegetable farming. The historical use of the site included crop farming, and according to the Gauteng Agricultural Potential Atlas (GAPA 4) the site does not have high crop agricultural potential. Due to its' small size, as well as previous and current land use practices,

Questions (Notice 792, NEMA, 2012)		Answer
		the site is ideal for small-scale pig and vegetable farming, and the environmental impacts associated with this use are minimal as the area is not high of high environmental sensitivity. The piggery is located in a rural area with very low-density dwellings, making it suitable for this type of environment.
2.	Would the approval of this application compromise the integrity of the existing approved and credible IDP and SDF as agreed to by the relevant authorities?	No. The proposed project intends to align its' objectives with that of the Regions SDF, which are directly linked to Tshwane's 2016 -20121 IDP and 2055 vision. It aims to aligned to the following objectives: • Promote shared economic growth and job creation • Improve financial sustainability • Continue institutional development, transformation and innovation
3.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	No. The agricultural sector is one of the identified targeted for sectors in the Gauteng Growth and Development Strategy. The proposed development falls within areas demarcated for agriculture, as identified in the 2014 Gauteng Provincial EMF, and therefore the integrity of the existing environmental management priorities for the area will not be compromised by this development. It is also evident in view of the provincial SDF that there is also an emphasis on preserving a strong agricultural base.
4.	Do location factors favour this land use at this place? (this relates to the contextualization of the proposed land use on this site within its broader context).	Yes. The site falls within an area demarcated for agricultural development in the greater framework of the province. This is also attributed to agriculture having a strong social element in that it provides employment and housing to a significant proportion of the population, creating a unique social environment associated within rural areas.
5.	How will the activity of the land use associated with the activity being applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	The development of the proposed development associated infrastructure measuring around 8 ha in size will exert an impact on the environment; but based on the findings of the Ecological Impact Assessment (Appendix G), and as per the ecologist recommendation and the locality of the site, the impacts associated with this proposed development can be mitigated and in implementing those measures effectively can have a significantly low impact.
6.	How will the development impact on people's health and well-being? (E.g. In terms of noise, odours, visual character and sense of place, etc.)?	This is an existing piggery and the area has very few households, with the neighbours also engaged in farming activities therefore the visual character and sense of place aesthetics in the area is associated to agricultural activities and the proposed activity will not have a high significant impact in this regard.
7.	Will the proposed activity or the land use associated with the activity being applied for, result in unacceptable opportunity costs?	No. The South Africa pork industry is growing; pork production increased by an annual average of 4.5%, second to broiler production which grew by 6%. Production turnaround for pork is quicker and demand fundamentals for this product are unlikely to change.

	Questions (Notice 792, NEMA, 2012)	Answer
		This industry also presents opportunities in that there is a huge potential in the rural markets and exports to the SADEC region.
8.	Will the proposed land use result in unacceptable cumulative impacts?	No. The proposed project and associated activities has identified 3 cumulative impacts, with two of these having a low significant impact upon mitigation. The socio-economic impact will not be mitigated as mitigation will not result in job creation and improvement of the local socio-economic status. The measures outlined in the attached EMPr serve as mitigation methods to prevent the current and proposed project from having any serious long term cumulative impacts on the receiving environment.

10. THE PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED (CONSIDER WHEN THE ACTIVITY IS EXPECTED TO BE CONCLUDED)

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

11. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) (must include post construction monitoring requirements and when these will be concluded.)

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

EMPr attached	YES

Final Basic Assessment Report – Proposed Expansion of a Pig Production Enterprise for Legae La Thlago (Pty) Ltd
Plot 684 Agricultural Holdings, Winterveldt, Pretoria

SECTION F: APPENDICES

SECTION F: APPENDICES

APPENDICES

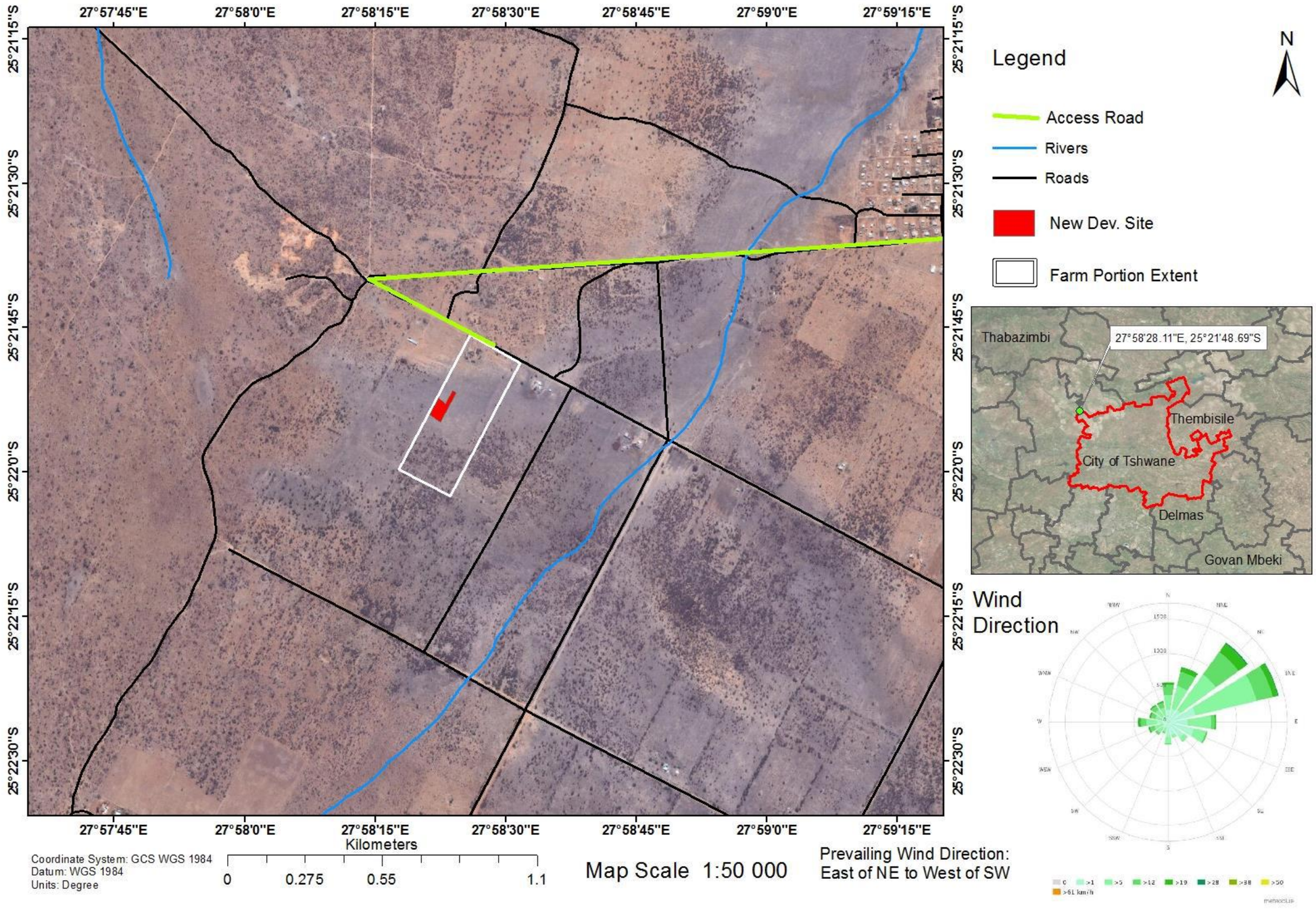
Appendix A	Site plan(s) – (must include a scaled layout plan of the proposed activities overlain on the site sensitivities indicating areas to be avoided including buffers)
Appendix B	Photographs
Appendix C	Facility illustration(s)
Appendix D	Route position information – **N/A**
Appendix E	Public participation information
Appendix F	Water use license(s) authorisation – **Not applicable at this stage** SAHRA information Service letters from municipalities - **Not applicable at this stage** Water supply information - **Not applicable at this stage**
Appendix G	Specialist Reports
Appendix H	Environmental Management Progamme
Appendix I	CVs of the EAPs (project team who prepared the report)

BASIC ASSESSMENT REPORT

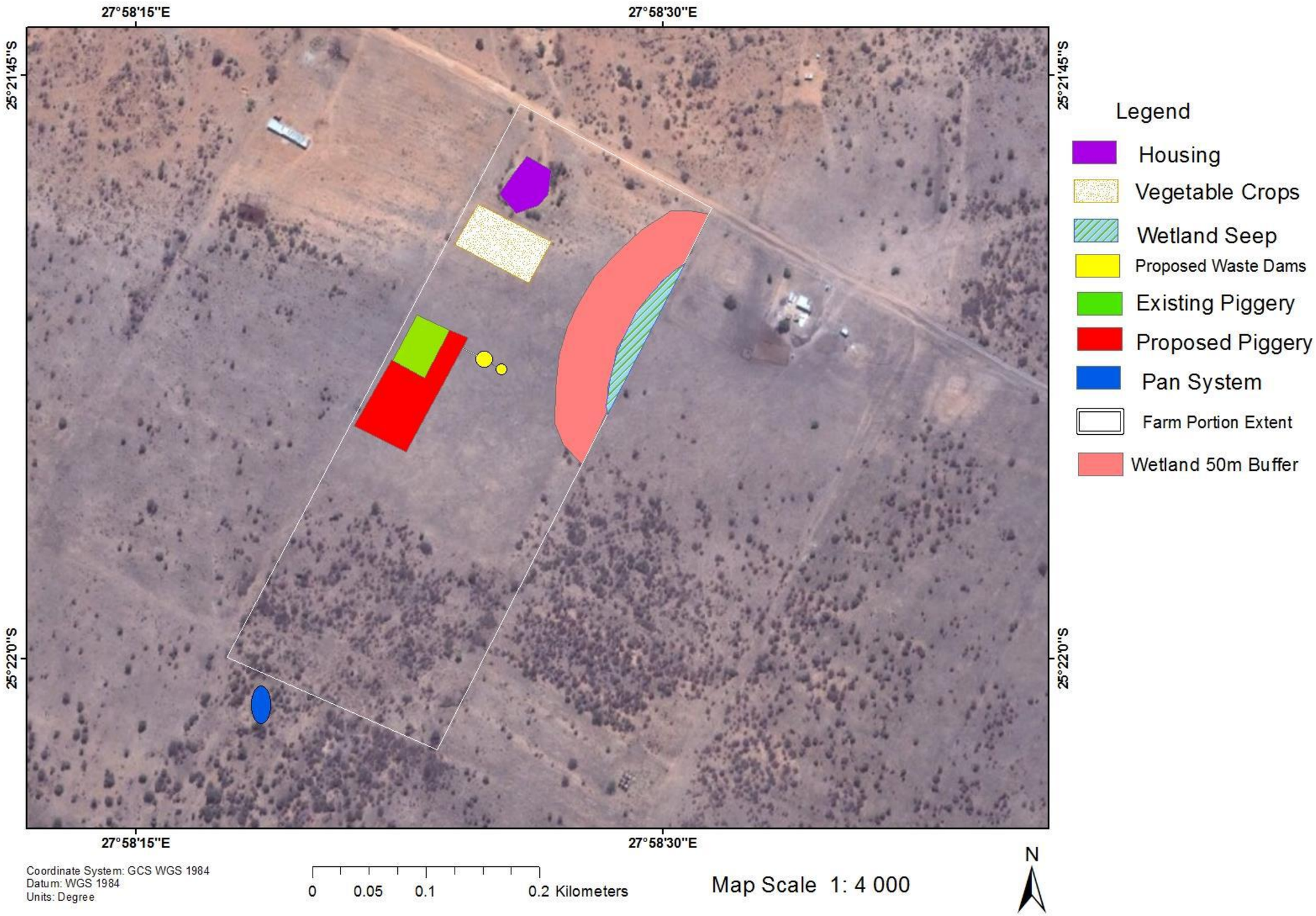
APPENDIX A: SITE PLAN(S)

contents

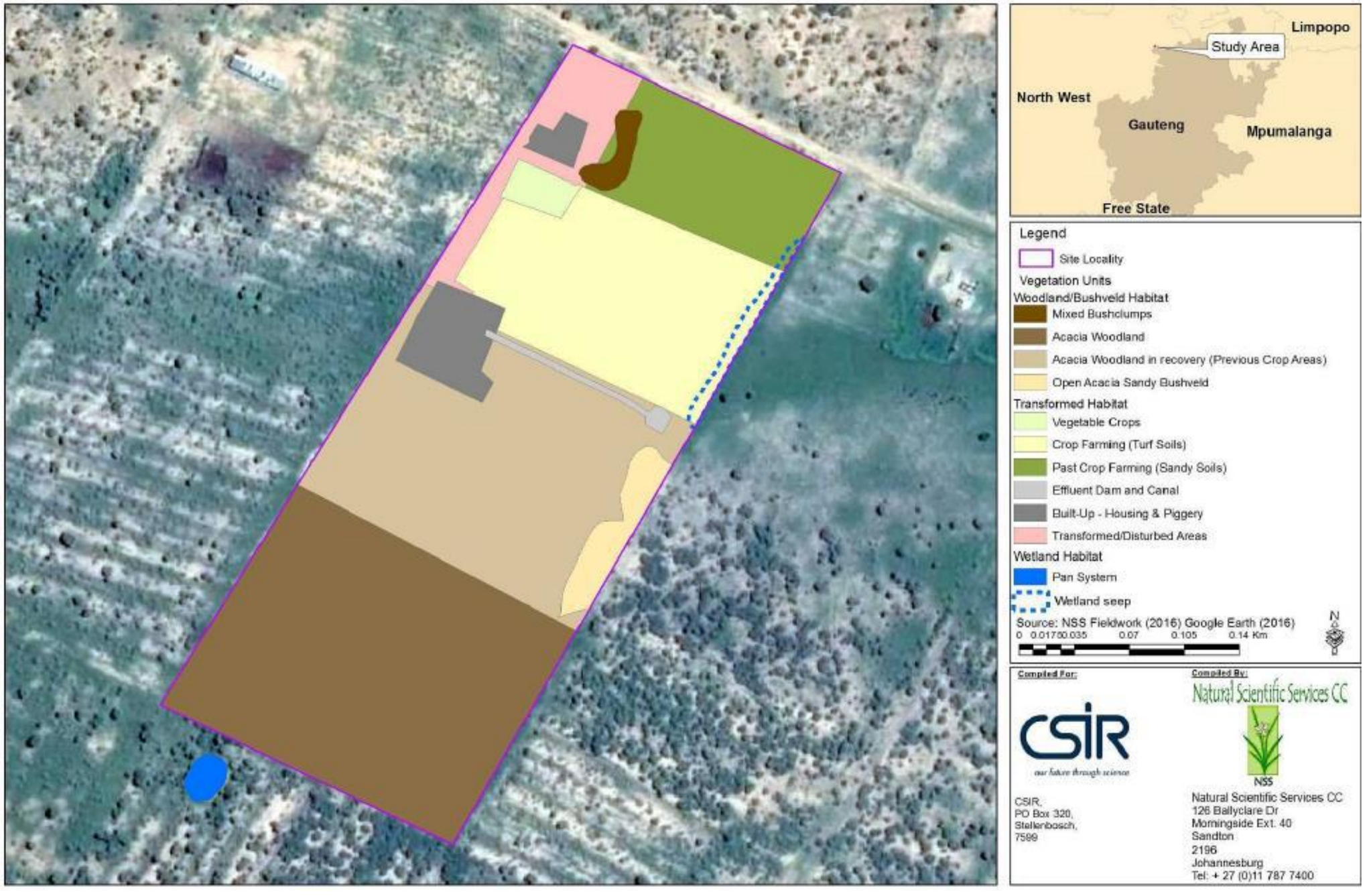
Map 1A: Legae La Tlhago Site Location on Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.



Map 1B: Legae La Tlhago Site Layout of current infrastructure and proposed Piggery expansion, including sensitivities on site.



Map 1C: Layout of vegetation found on the Legae La Tlhago Site.

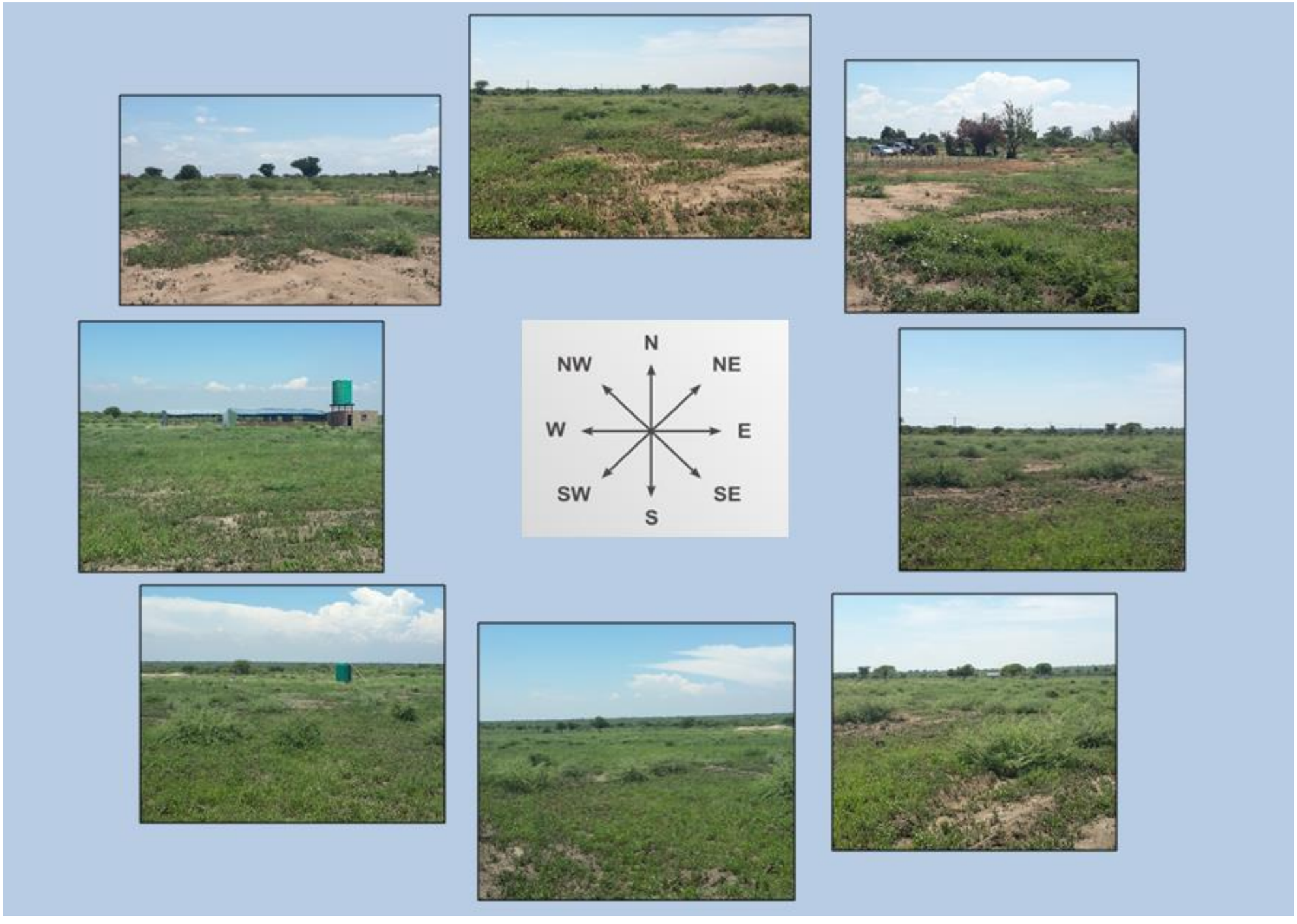


BASIC ASSESSMENT REPORT

APPENDIX B: PHOTOGRAPHS

contents

Legae La Tlhago Site Photographs taken in the eight major compass directions

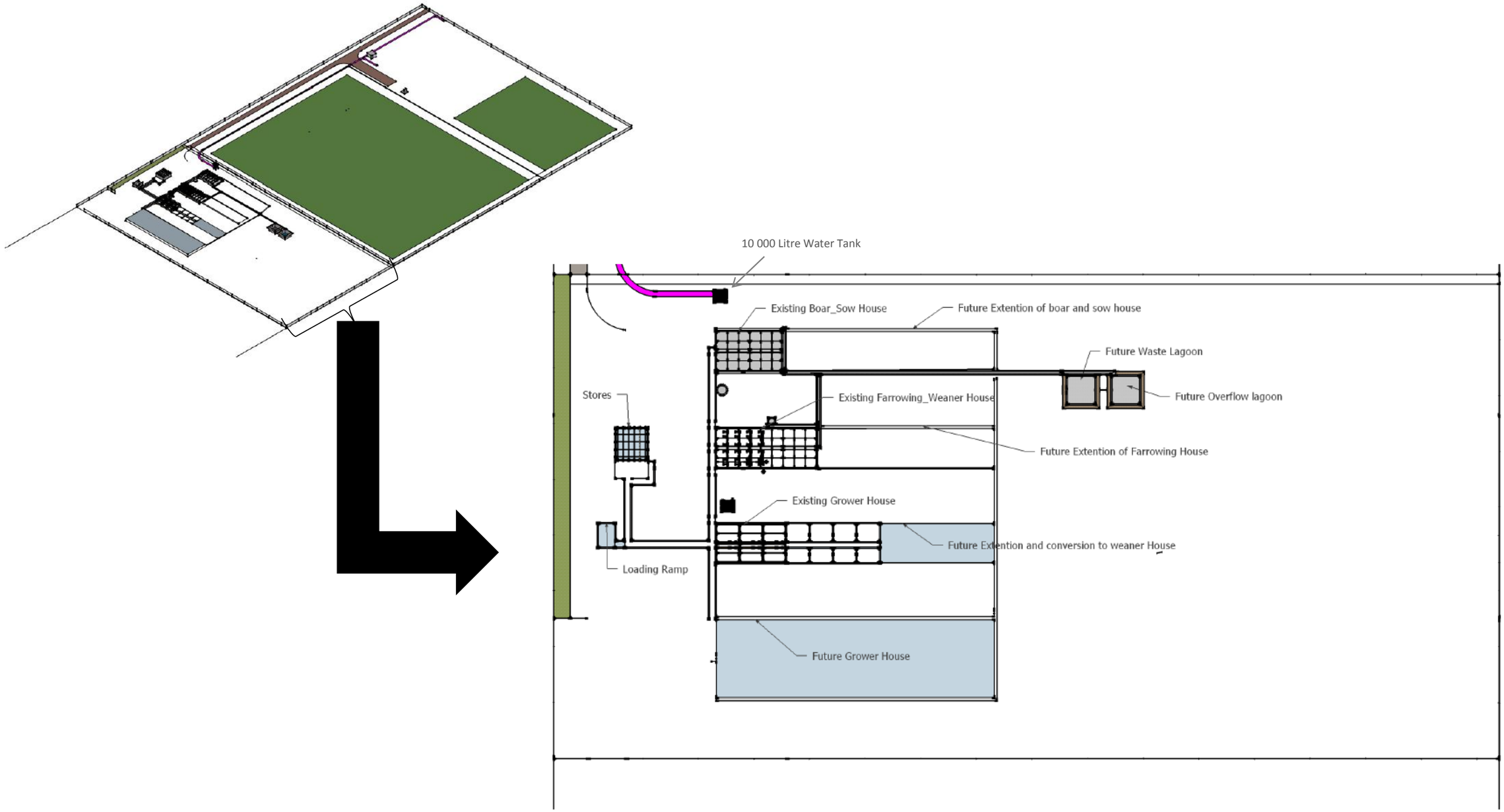


BASIC ASSESSMENT REPORT

APPENDIX C: FACILITY ILLUSTRATION(S)

contents

An illustration of the structures for the current and proposed Piggery relative to the site



BASIC ASSESSMENT REPORT

APPENDIX E: PUBLIC PARTICIPATION

contents

Appendix E1: Proof of Site Notice

English and SeTswana Site notices placed at the entrance of the proposed expansion site (Site Notice GPS location: 25°21'46.021"S 27°58'25.953"

Contents of the English Site notice

Legae La Tlhago (Pty) Ltd

(Plot 684 Winterveld Agricultural Holdings, Winterveldt, Pretoria)

Reference Number: CSIR/02100/EMS/IR/2016/0002/A

NOTICE OF A BASIC ASSESSMENT (BA) PROCESS

Notice is given in terms of the Environmental Impact Assessment (EIA) Regulations, under sub-regulation 41 (2) (a), published in Government Gazette (GG) No 38282 of 4 December 2014, of the National Environmental Management Act 1998 (Act No. 107 of 1998) and under GG No. 37083 of the National Environmental Management: Waste Act, (Act No. 59 of 2008), that the **Legae La Tlhago (Pty) Ltd** proposes the **expansion of a Pig production enterprise on Plot 684 Winterveldt Agricultural Holdings** in **Winterveldt, Pretoria.**

The Council for Scientific and Industrial Research (CSIR) has been appointed by the Legae La Tlhago (Pty) Ltd to undertake the required Basic Assessment process for the proposed project. The project will be registered with the Gauteng Department of Agriculture and Rural Development (GDARD). The need for a Basic Assessment is triggered by the following project activities listed in Government Notice Regulations (GNR) 983 of 4 December 2014.

Government Notice	Listed Activity Number
GNR 983, 4 December 2014	27
GNR 983, 4 December 2014	39 (ii)(b)
GNR 921, 29 November 2013	Category A: 1 & 12

This notice is also in terms of the National Environmental Management: Waste Act (NEMWA 59 of 2008), as amended, where there are Listed Activities related to waste that the proposed project triggers. The BA Process will therefore include a Waste Management Licence Application.

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 the Project Manager below, and quote the CSIR Reference Number:

Ms Babalwa Mqokeli
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2963
Email: bmqokeli@csir.co.za

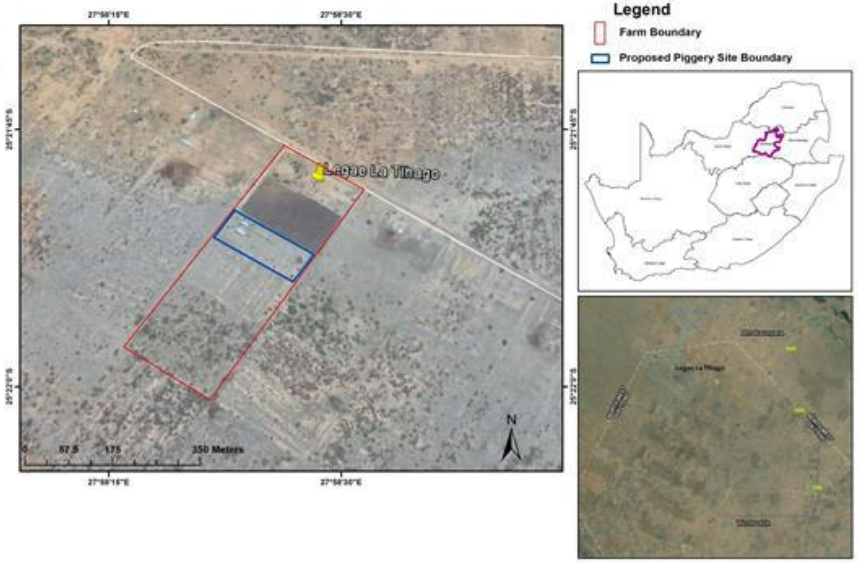


Fig. 1. Legae La Tlhago's Proposed Piggery Expansion Farm, Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.

Contents of the SeTswana Site notice

Legae La Tlhago (Pty) Ltd

(Plot 684 Winterveld Agricultural Holdings, Winterveldt, Pretoria)

Nomoro ya Referense : CSIR/02100/EMS/IR/2016/0002/A

KITSISO YA TIRELO YA BASIC ASSESSMENT (BA)

Le itsisiwe gore, go ya ka melao ya Tlhatlhobo ya Tikologo (EIA), ka fa tlase ga molawana-tsamaiso 41(1) le molawana-tsamaiso 41(4), e e gatisitweng ka Gazeteng ya Mmuso ya nomoro 38282 wa Sedimonthole 2014, ya Molao wa Lekgotla la Taolo ya Tikologo, 1998 (Molao 107 wa 1998), gore **Legae La Tlhago (Pty) Ltd** le eletsa go oketsa ntlo ya leruo la dikolobe fa tshimong ya **Plot 684 Winterveldt Agricultural Holdings** kwa **Winterveldt, Pretoria.**

Lekgotla la Dipatlisiso tsa Saense le Indasteri (Council for Scientific & Industrial Research -CSIR), le le ikemetseng ka di tlhatlhobo tsa tikologo, le tlo laola tsaimaiso ya tlhatlhobo ya tikologo ya projekte. Projekte e tla kwadisiwa le Lefapha la Temo le Tlhabologo ya Dinagamagae la Gauteng (GDARD). Tlhatlhobo ya tikologo e tlhokagala gonne e tsositse ditiro tse di latelang tsa Kitsiso ya Melao wa Mmuso(GNR) 983 le 985 ya 4 Sedimonthole 2014.

Kitsiso ya Mmuso	Nomoro ya Tiro
GNR 983, 4 Sedimonthole 2014	27
GNR 983, 4 Sedimonthole 2014	39 (ii)(b)

Le itsisiwe gape ka Molao wa Lekgotla la Taolo ya Tikologo: Taolo ya Matlakala (NEMWA 59 ya 2008), go re projekte e na le ditiro tse di amanang le matlakala. Tlhatlhobo ya Tikologo e tla tlhakantsha tsamaisa-tiro ya laesense a taolo ya matlakala.

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

Ms Babalwa Mqokeli
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2963
Email: bmqokeli@csir.co.za

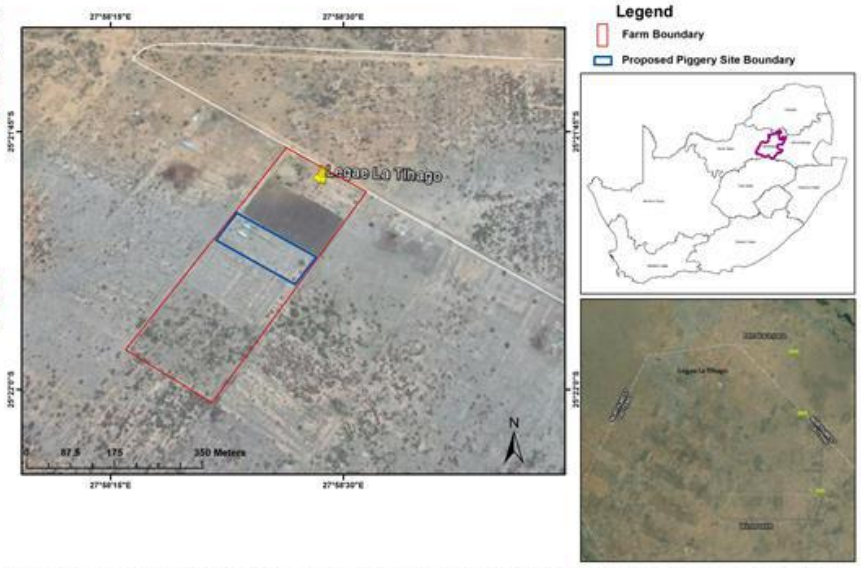


Fig. 1. Legae La Tlhago's Proposed Piggery Expansion Farm, Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.

Appendix E2: Written notices issued as required in terms of the regulations

Letter sent (11/04/16) to I&APs as part of Project Announcement

CSIR Specialist Services
PO Box 320
Stellenbosch
7599
South Africa
Tel: +27 21 888 2432
Fax: +27 21 888 2693
Email: bmqokeli@csir.co.za

08 April 2016

Dear Interested and/or Affected Party,

PROJECT ANNOUNCEMENT

BASIC ASSESSMENT FOR LEGAE LA TLHAGO (PTY) LTDS' PROPOSED EXPANSION OF A PIG PRODUCTION ENTERPRISE ON PLOT 684 WINTERVELDT AGRICULTURAL HOLDINGS IN WINTERVELDT, PRETORIA

CSIR REFERENCE NO: CSIR/02100/EMS/IR/2016/0002/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. Legae La Tlhago (PTY) Ltd has been identified as an eligible client for this service and is proposing the expansion of a pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.

In terms of Government Notice Regulations (GNR) 983, 984 and 985 of 8 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 Gauteng Department of Agriculture and Rural Development (GDARD), is required prior to the undertaking of any activity triggered within GNR 983, 984 and/or 985. 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 4 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 **14 May 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 another language, please do not hesitate to contact the CSIR and we will assist.

Yours sincerely,

Ms. Babalwa Mqokeli (Project Manager)
Postal address: PO Box 320, Stellenbosch, 7599, South Africa
Tel: 021 888 2432
Fax: 021 888 2693
E-mail: bmqokeli@csir.co.za
Website: http://www.csir.co.za/ems/specialneeds/

Letter sent (11/04/16) to I&APs as part of Project Announcement

From: Babalwa Mqokeli
To:
BC SHlela@environment.gov.za; mrabothata@environment.gov.za; tnemarude@environment.gov.za; bonginkosi.zulu@drdlr.gov.za; mashuduma@daff.gov.za; thokob@daff.gov.za; MohapiN@dwa.gov.za; MuthraparsadN@dwa.gov.za; steven.mukhola@gauteng.gov.za; karabo.mohatla@gauteng.gov.za; khalele.njoni@gauteng.gov.za; phuti.matlamela@gauteng.gov.za; albert.marumo@gauteng.gov.za; MusekeneM@dwa.gov.za; RakgothoT@dwa.gov.za; bethuel.netshiswinzhe@gauteng.gov.za; phindile.mbanjwa@gauteng.gov.za; maphata.ramphele@gauteng.gov.za; Zingisa.Smale@gauteng.gov.za; celiam@tshwane.gov.za; lelokop@tshwane.gov.za; shanellec@tswane.gov.za; minetteb@tswane.gov.za; rudzanim@tshwane.gov.za; mamphekoamos@yahoo.com; mokwena@gmail.com; tsakgwe@gmail.com; tumi.lehabe@wessa.co.za; adamp@ewt.org.za; ewt@ewt.org.za; Sfoya@geoscience.org.za; advocacy@birdlife.org.za; howard.hendricks@sanparks.org; Victoria Bota (HO); Khathutshelo Ramavhoya (HO)
Date: 11/04/2016 09:34
Subject: Notification of Release of BID for Basic Assessment for the Proposed Expansion of a Pig Production Enterprise, and Associated Infrastructure, Winterveldt, Pretoria
Attachments: 2016 04 BID Legae la Thlago.pdf; Comments & Reg Form.docx; Letter to I&APs_BID.docx

Good morning,

You are hereby notified about the release of the Background Information Document (BID) regarding a Basic Assessment for the proposed expansion of a pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. Please find attached the BID, which has been released for 30 day review, and the Registration/ Comment Form. Please return on or before 14 May 2016.

Should the contents of this project not pertain to you, kindly forward the documents to the person in your department that is affected. Additionally, please forward their contact details to the CSIR Project Manager or ask the affected party to contact the CSIR Project Manager. Should you wish to be registered or de-registered from receiving any further information during the Basic Assessment and Public Participation Process, kindly contact the CSIR Project Manager. Correspondence in this regard should preferably be written, i.e. Email, Fax or Letter.

Contact via: Ms. Babalwa Mqokeli
Email: *bmqokeli@csir.co.za*

Tel: 021 888 2432
Fax: 021 888 2693

Postal: PO Box 320
Stellenbosch
7599
South Africa

Regards,
Babalwa

Proof email delivery sent on 11 April 2016

adamp@ewt.org.za Transferred
Transferred 11/04/2016 09:34
Delivered 11/04/2016 10:07
BC: adamp@ewt.org.za

advocacy@birdlife.org.za Transferred
Transferred 11/04/2016 09:34
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BC: advocacy@birdlife.org.za

albert.marumo@gauteng.gov.za Transferred
Transferred 11/04/2016 09:34
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BC: albert.marumo@gauteng.gov.za

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ewt@ewt.org.za Transferred
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howard.hendricks@sanparks.org Transferred
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BC: RamavhoyaK@nra.co.za

lelokop@tshwane.gov.za Transferred
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minetteb@tswane.gov.za Undeliverable
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phuti.matlamela@gauteng.gov.za Transferred

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BC: phuti.matlamela@gauteng.gov.za

RakgothoT@dwa.gov.za Transferred

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rudzanim@tshwane.gov.za Transferred

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tsakgwe@gmail.com Transferred

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BC: tsakgwe@gmail.com

tumi.lehabe@wessa.co.za Transferred

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BC: tumi.lehabe@wessa.co.za

Victoria Bota (HO) Transferred

Transferred 11/04/2016 09:34
Delivered 11/04/2016 09:37
BC: BotaV@nra.co.za

Zingisa.Smale@gauteng.gov.za Transferred

Transferred 11/04/2016 09:34
Delivered 11/04/2016 09:37
BC: Zingisa.Smale@gauteng.gov.za

Postal List for mail sent 12/04/16: Project Announcement documents (BID, Letter dated 08 April 2016, and Registration/Comment Form)

Department of Environmental Affairs-National Mmatlala Rabothata Private Bag X447 Pretoria 0002	Department of Rural Development and Land Reform Bonginkosi Zulu Private Bag X833 Pretoria 0001	National Department of Water and Sanitation Ndileka Mohapi Private Bag X313 Pretoria 0001
Department of Agriculture, Forestry and Fisheries Mashudu Marubini Private Bag X138 Pretoria 0001	Department of Agriculture, Forestry & Fisheries Ms Thoko Buthelezi Private Bag X120 Pretoria 0001	National Department of Water & Sanitation Namisha Muthraparsad Private Bag X313 Pretoria 0001
Department of Agriculture & Rural Development Steven Mukhola PO Box 8769 Johannesburg 2000	Department of Agriculture & Rural Development Karabo Mohatla PO Box 8769 Johannesburg 2000	Department of Agriculture & Rural Development Khalele Njoni PO Box 8769 Johannesburg 2000
Department of Agriculture & Rural Development Phuthi Matlamela PO Box 8769 Johannesburg 2000	Gauteng Department of Infrastructure Development Bethuel Netshiswinzhe Private Bag X83 Marshalltown 2107	Gauteng Department of Economic Development Phindile Mbanjwa Private Bag X091 Marshalltown 2107
Gauteng Department of Agriculture & Rural Development Zingisa Smale PO Box 8769 Johannesburg 2000	Ms Celia M City of Tshwane Metropolitan Municipality PO Box 1454 Pretoria 0001	Mr Leloko Puling City of Tshwane Metropolitan Municipality PO Box 1454 Pretoria 0001

Mr Jason Ngobeni City of Tshwane Metropolitan Municipality PO Box 6338 Pretoria 0001	South African National Parks (SANParks) Dr. Howard Hendriks PO Box 787 Pretoria 0001	Ms Rudzani Mukheli City of Tshwane Metropolitan Municipality PO Box 1454 Pretoria 0001
Council for Geoscience Dr Stewart Foya Private Bag X112 Pretoria 0001	South African Heritage Resources Agency (SAHRA) Marie South PO Box 4637 Cape Town 8000	AgriLand Anneliza Collett Private Bag X120 Pretoria 0001
Grasslands Society of South Africa Feyni Du Toit P.O. Box 41 Hilton 3245	T Matjeke 1017 Block GG Soshanguve 0152	Tshwane Ward 24 Councillor Mr Amos M Mampheko PO Box 1075 Winterveldt 0198
The Provincial Heritage Resources Authority Gauteng Mamphata Ramphele Private Bag X33 Johannesburg 2000	Department of Health Albert Marumo Private Bag X35 Johannesburg 2000	Department of Water & Sanitation Ms M Musekene Private Bag X313 Pretoria 0001
Department of Water & Sanitation Ms T Rakgotho Private Bag X313 Pretoria 0001	Mr Adam Pires The Endangered Wildlife Trust Private Bag X11 Modderfontein Johannesburg 1609	Dr Harriet Davies-Mostert The Endangered Wildlife Trust Private Bag X11 Modderfontein Johannesburg 1609
Eskom John Geeringh PO Box 1091 Johannesburg 2000		

Appendix E3: Proof of newspaper advertisements

Newspaper advertisement in English published in Pretoria News on 11 April 2016

News

PRETORIA NEWS

Over-inflated price paid for former brothel

But sale hits snag as property is under attachment by Asset Forfeiture Unit and a refusal to sign transfer deed

White night as revellers dine in festive style

Court orders seizure of officials' assets

Woman who fell at 1 Military Hospital bids to sue

Smart ID seekers unsure about going to the banks

Newspaper advertisement in SeTswana published in the Daily Sun newspaper on 11 April 2016

18 DAILY SUN Monday 11 April 2016

PENIS HORROR!

Private parts found in a bag

By NCOMOTSO RAMOTSHO

THABISO Shakwane (31) saved his brother from a man who wanted to cut off his penis and balls.

Thabiso grabbed a brick and hit the man who was fighting with his brother, Khothatso Shakwane (25).

The incident happened on Thursday at about 7am in Block F Soshanguve.

The man was trying to stab Khothatso with a pair of scissors.

After the stranger was hit with a brick he ran away and dropped the bag he was carrying.

"I picked up the bag and emptied it.

"I was greeted by the sight of a penis still attached to its balls. It was full size and not circumcised with pubic hair on it," Thabiso said.

He said there was wool, a bottle with white muthi inside, blue underpants, a belt and some other things.

Thabiso said he called his friends and they decided to search for the man.

He said at a house near Soshanguve Police Station they found the naked body of a young man. It was covered with stones.

"His underwear was on his knees and his shoes were next to his body," said Thabiso.

Soshanguve Police Station spokeswoman, Constable Renellwe Makwalo said a case of murder has been opened. She couldn't say whether the penis belonged to the body.

She said the police were still investigating.

Cops were called after a man left his bag with genitals. *Photo by Samson Ratswana*

Mpho's hell is getting worse

By MARGARET MLANGENI

NOT only has mum Mpho Kekana lost two kids, but something dark is haunting her.

At night, shadows on the wall turn into spiders she says crawl under her skin.

And now she said even her punani has started vibrating uncontrollably, stopping her from sleeping and draining her energy.

Daily Sun first reported Mpho's nightmares in September 2014. It all started after her four-month-old son Thomas died in his sleep.

Mpho (25) ,from Tshwane central, said she saw spiders under her skin. Many people offered advice, but nothing helped.

Then she fell pregnant again, but her baby girl died soon after being born. Now things have become so bad she claims even the TV seems possessed by people talking to her.

Mpho said a sangoma told her she stepped on muthi meant to kill her while pregnant and it struck her baby. She has tried everything, from washing the walls to consulting sangomas and churches, without any luck.

This week she told *Daily Sun* she has started seeing crawling insects and reptiles. "Now the evil creatures are on my back. I cannot sit properly or sleep." Her husband Solly said he felt sorry for his wife. "I wish a real sangoma could rid her of these problems." Sangoma Kediboна Mabоa said Mpho needed to be cleansed and do *fembisa*, so the person bewitching her is revealed.

KITSISO YA TSHEKATSHEKO YA TIKOLOGO

CSIR Reference No: CSIR/02100/EMS/IR/2016/0002/A

Kitsiso ya Tlhatlhobo ya Tikologo (Basic Assessment; BA) e tlwa rulaganong wa Legae La Tlhago (Pty) Ltd (mokwadisi wa Projekte), ba ba batlang go **akatsa kgwebo ya go rua dikolobe, fa lefelong ya 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.**

Go ya ka melao ya Tshekatsheko ya Tikologo (NEMA EIA Regulations) e e gatisitsweng ka fa tlase ga Kitsiso ya Molao wa Mmuso (GNR) 983 le 985 ya 4 Sedimonthole 2014, Gazeteng ya Mmuso 38282, le Molao ya Tshekatsheko ya Matlakala (NEM:WA), e e gatisitsweng ka fa tlase ga Kitsiso ya Molao wa Mmuso (GNR) 921 ya 29 Ngwanatsele 2013 GG No. 37083, e laola gore Tlhatlhobo ya Tikologo (BA) e ya tlhokagala ka ntlha ya ditiro tse di latelang: *GNR 983 Ditiro 27 & 39(i)(b) le GNR 921 Ditiro 1 & 12.*

Lekgotla la Dipatlisiso tsa Saense le Indasteri (Council for Scientific and Industrial Research, CSIR) e tlo laola tsamaiso ya Tshekatsheko ya Tikologo ya Projekte.

Go tsena ka go tlhagiso maikutlo ka tsamaisong ya Tshekatsheko ya Tikologo, le ikwadisa go kwadisa jaaka makgatlhegi/moamegi wa projekte. Fa le tlhoka dintlha tsa projekte le/kgotsa go ikwadisa jaaka makgatlhegi/moamegi, fana ka leina le sefane la botlalo, aterese ya poso, nomoro ya fono, aterese ya imeile, le go fa lebaka la kgatlhego kgotsa la kamego go: **Ms. Babalwa Mqokeli, CSIR, PO Box 320, Stellenbosch 7599, Phone (021) 888 2432, Fax: (021) 888 2693 or Email: bmqokeli@csir.co.za.** Ka kopo, ikopanye le motho yo goreng go malatsi a 30 go simolola ka la kwalwiso ena.

CSIR

Kabelo Mabalane walks the streets of Eersterust with residents to condemn substance abuse. *Photo by Samson Ratswana*

March against drugs

By KARABO RAMMUTLA

"DRUGS must fall, drugs must fall!"

That was the song that filled the air as residents of Eersterust, near Mamelodi in Tshwane took to the streets on Saturday to march against escalating drug abuse in their kasi. The march was led by kwaito star Kabelo Mabalane, who is a former addict.

The marchers carried placards that condemned drug abuse in the kasi and were joined by residents from neighbouring townships.

This was not the first time that Kabelo has marched against drugs in the township. He walked the same streets 14 years ago when he got out of rehab. He said he had to come back to Eersterust because he realised that the drug problem was escalating instead of ending.

Lulekwa Ntshongwana of Sukuma Sakhe Development said the march was a call to act against drugs.

"Everyone should take responsibility and we should stop blaming other people, parents, drug users, dealers. All community members need to take responsibility," he said.

Where is my friend's family?

By BARNARD MAHNE

MINIKI Magabe (40) from Bokfontein, North West is looking for the family of her dead friend, Jerry Wittes (57).

Jerry was from Randfontein, west of Joburg.

He moved to Bokfontein in 2002 to work as a welder for a construction company in the area. Miniki said she and Jerry were renting rooms in the same house.

In 2012, Jerry moved to Majakaneng, where he continued with his welding work.

"That's when he became very ill," said Miniki.

Last month Jerry's condition worsened and he was admitted to Bapong Clinic in Brits. He ran away from the clinic and died last Saturday at his house in Majakaneng.

Miniki said Jerry once told her about his brother, Oupa.

He also said he knew his mum was still alive.

"I am pleading with his family to come and fetch his body at the mortuary."

"I don't want Jerry to have a beggar's burial. I want him to be given a dignified funeral," she said.

Anyone with information can contact Miniki on 060 796 2240.

Jerry Wittes

Contents of the Newspaper advertisement in English published in the Pretoria News on 11/04/16

NOTICE OF AN ENVIRONMENTAL BASIC ASSESSMENT

CSIR Reference No: CSIR/02100/EMS/IR/2016/0002/A

Notice is given of a Basic Assessment (BA) process being undertaken on behalf of Legae La Tlhago (Pty) Ltd (the Project Applicant) for the proposed **expansion of a Pig production enterprise, on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria**.

In terms of the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations published in the Government Notice Regulation (GNR) No. 983 and 985 of 4 December 2014 Government Gazette (GG) 38282, and the National Environmental Management Waste Act (NEM:WA) Regulation published in GNR 921 on the 29 November 2013 GG No. 37083, a BA process is required as the project triggers the following listed activities: *GNR 983 Activities 27 & 39(ii) (b) and GNR 921 Activity 1 & 12.*

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 on the project and/or to register as an I&AP, please provide your full name, full postal address, phone numbers, email address and state your area of interest and/or concern to: **Ms. Babalwa Mqokeli, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: bmqokeli@csir.co.za. Please contact the indicated person within 30 days of this notification**.

CSIR
our future through science

Contents of the Newspaper advertisement in SeTswana published in the Pretoria News on 11/04/16

KITSISO YA TSHEKATSHEKO YA TIKOLOGO

CSIR Reference No: CSIR/02100/EMS/IR/2016/0002/A

Kitsiso ya Tlhatlhobo ya Tikologo (Basic Assessment, BA) e fiwa molemong wa Legae La Tlhago (Pty) Ltd (mokwadisi wa Projekte), ba ba batlang go **oketsa kgwebo ya go rua dikolobe, fa tshimong ya 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria**.

Go ya ka melao ya Tshekatsheko ya Tikologo (NEMA EIA Regulations) e e gatisitsweng ka fa tlase ga Kitsiso ya Molao wa Mmuso (GNR) 983 le 985 ya 4 Sedimonthole 2014, Gazeteng ya Mmuso 38282, le Molao ya Tshelatshenko ya Matlakala (NEM:WA), e e gatisitsweng ka fa tlase ga Kitsiso ya Molao wa Mmuso (GNR) 921 ya 29 Ngwanatsele 2013 GG No. 37083, e laola gore Tlhatlhobo ya Tikologo (BA) e ya tlhokagala ka ntlha ya ditiro tse di latelang: *GNR 983 Ditiro 27 & 39(ii) (b) le GNR 921 Ditiro 1 & 12.*

Lekgotla la Dipatlisiso tsa Saense le Indasteri (Council for Scientific and Industrial Research, CSIR) e tlo laola tsamaiso ya Tshekatsheko ya Tikologo ya Projekte.

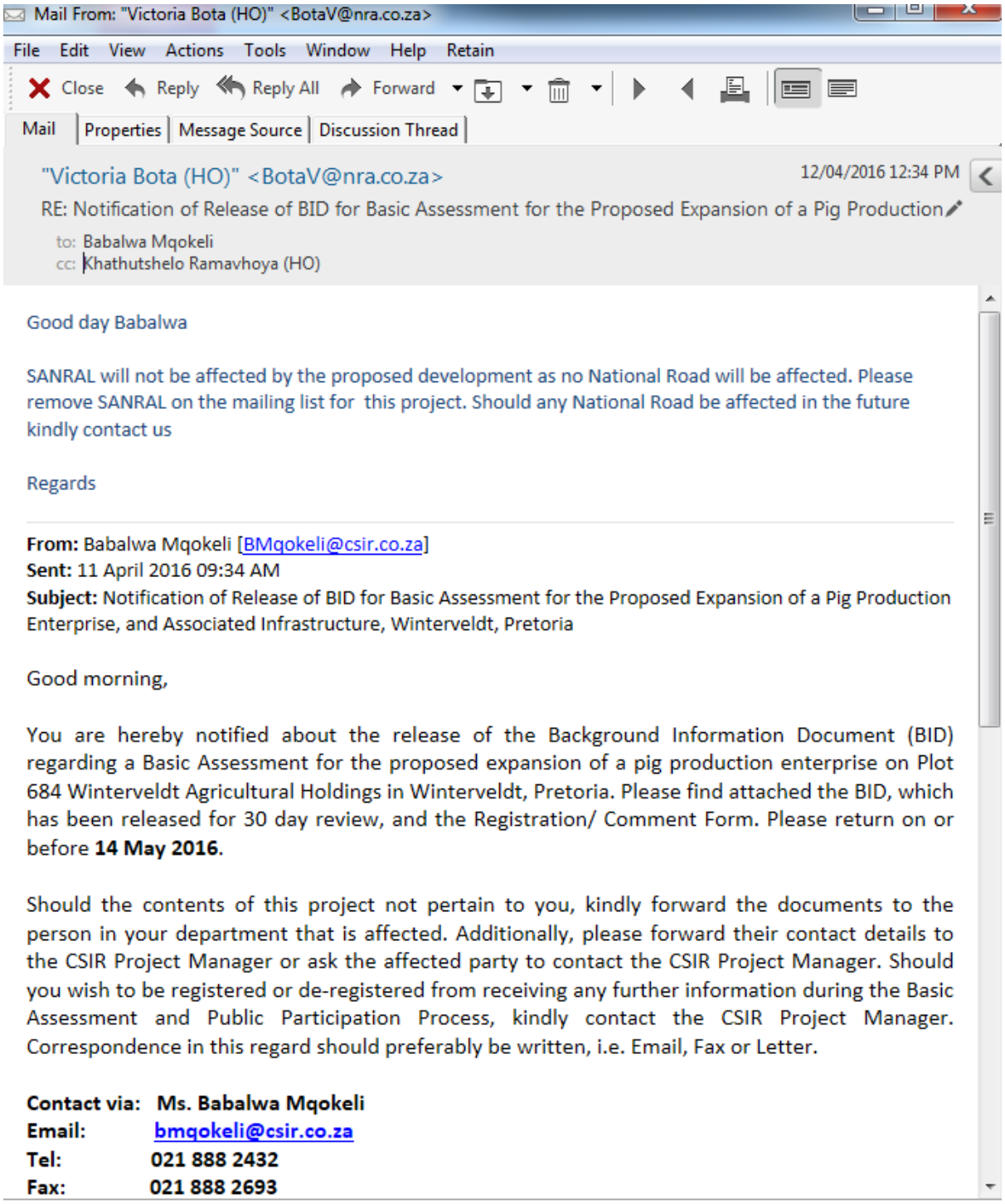
Go fana ka go tlhagisa maikutlo ka tsamaisong ya Tshekatsheko ya Tikologo, le lalediwa go ikwadisa jaaka mokgatlhegi/moamegi wa projekte. Fa le tlhoka dintlha tsa projekte le/kgotsa go ikwadisa jaaka mokgatlegi/moamegi, fana ka leina le sefane ka botlalo, aterese ya poso, nomoro ya fono, aterese ya imeile, le go fa lebaka la kgatlhego kgotsa la kamego go: **Ms. Babalwa Mqokeli, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: bmqokeli@csir.co.za**. Ka kopo, ikopanye le motho yo gareng ga malatsi a 30 go simolala ka la tsebiso ena.

CSIR
our future through science

Appendix E4: Communications to and from interested and affected parties

(In response to Project Announcement documents)

1.



Mail From: "Victoria Bota (HO)" <BotaV@nra.co.za>

File Edit View Actions Tools Window Help Retain

Close Reply Reply All Forward

Mail | Properties | Message Source | Discussion Thread

"Victoria Bota (HO)" <BotaV@nra.co.za> 12/04/2016 12:34 PM

RE: Notification of Release of BID for Basic Assessment for the Proposed Expansion of a Pig Production

to: Babalwa Mqokeli
cc: Khathutshelo Ramavhoya (HO)

Good day Babalwa

SANRAL will not be affected by the proposed development as no National Road will be affected. Please remove SANRAL on the mailing list for this project. Should any National Road be affected in the future kindly contact us

Regards

From: Babalwa Mqokeli [BMqokeli@csir.co.za]
Sent: 11 April 2016 09:34 AM
Subject: Notification of Release of BID for Basic Assessment for the Proposed Expansion of a Pig Production Enterprise, and Associated Infrastructure, Winterveldt, Pretoria

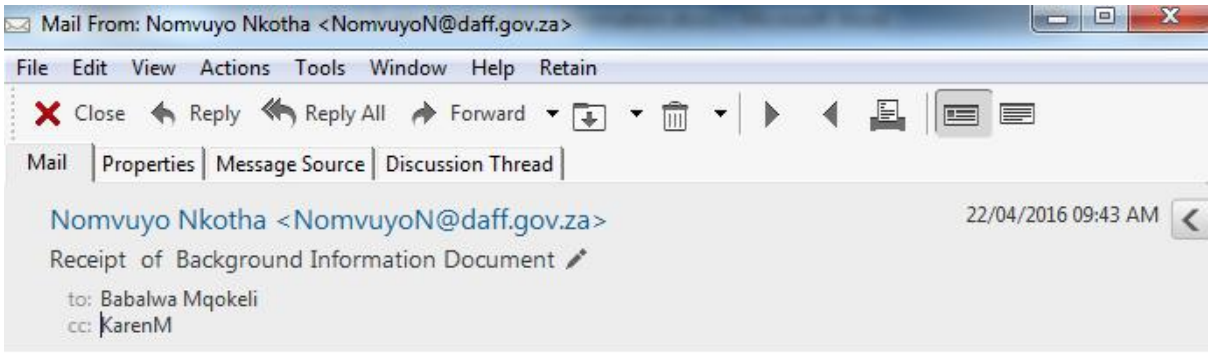
Good morning,

You are hereby notified about the release of the Background Information Document (BID) regarding a Basic Assessment for the proposed expansion of a pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. Please find attached the BID, which has been released for 30 day review, and the Registration/ Comment Form. Please return on or before **14 May 2016**.

Should the contents of this project not pertain to you, kindly forward the documents to the person in your department that is affected. Additionally, please forward their contact details to the CSIR Project Manager or ask the affected party to contact the CSIR Project Manager. Should you wish to be registered or de-registered from receiving any further information during the Basic Assessment and Public Participation Process, kindly contact the CSIR Project Manager. Correspondence in this regard should preferably be written, i.e. Email, Fax or Letter.

Contact via: Ms. Babalwa Mqokeli
Email: bmqokeli@csir.co.za
Tel: 021 888 2432
Fax: 021 888 2693

2.



Good morning madam,

DAFF has received your background information document for the **Proposed expansion of a Pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.** Could you kindly forward the above mentioned document to Mr Izak van der Merwe, izakvdm@daff.gov.za.

Kind regards,
Nomvuyo Nkotha *(Ms)*
Department of Agriculture, Forestry and Fisheries
Directorate :Forestry Regulations and Support
Designation: Intern
Tel: 033 392 7728
Web: www.daff.gov.za
E-mail: NomvuyoN@daff.gov.za

agriculture, forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

--

3.

agriculture, forestry & fisheries

Department:
Agriculture, forestry & fisheries
REPUBLIC OF SOUTH AFRICA

Directorate Land Use and Soil Management, Private Bag x120, Gezina Pretoria, 0031
Delpen Building, c/o Annie Botha & Union Streets, Riviera

From: Director: Land Use and Soil Management
Tel: (012) 319 7634 **Fax:** (012) 329 5938 **e-mail:** nhlakad@daff.gov.za

CSIR
PO Box 320
Stellenbosch
7599

7June 2016

Dear Si/Madam

This serves as a notice of receipt and confirms that your application has been captured in our electronic AgriLand tracking and management system. It is strongly recommended that you use the on-line AgriLand application facility in future.

Detail of your application as captured:

Application type: Applicability
Your reference:
Property Description: ***Plot 684 Winterveldt AH***
Dated: ***8 April 2016***

Please use the following reference number in all enquiries:

AgriLand reference number: 2016_06_0030

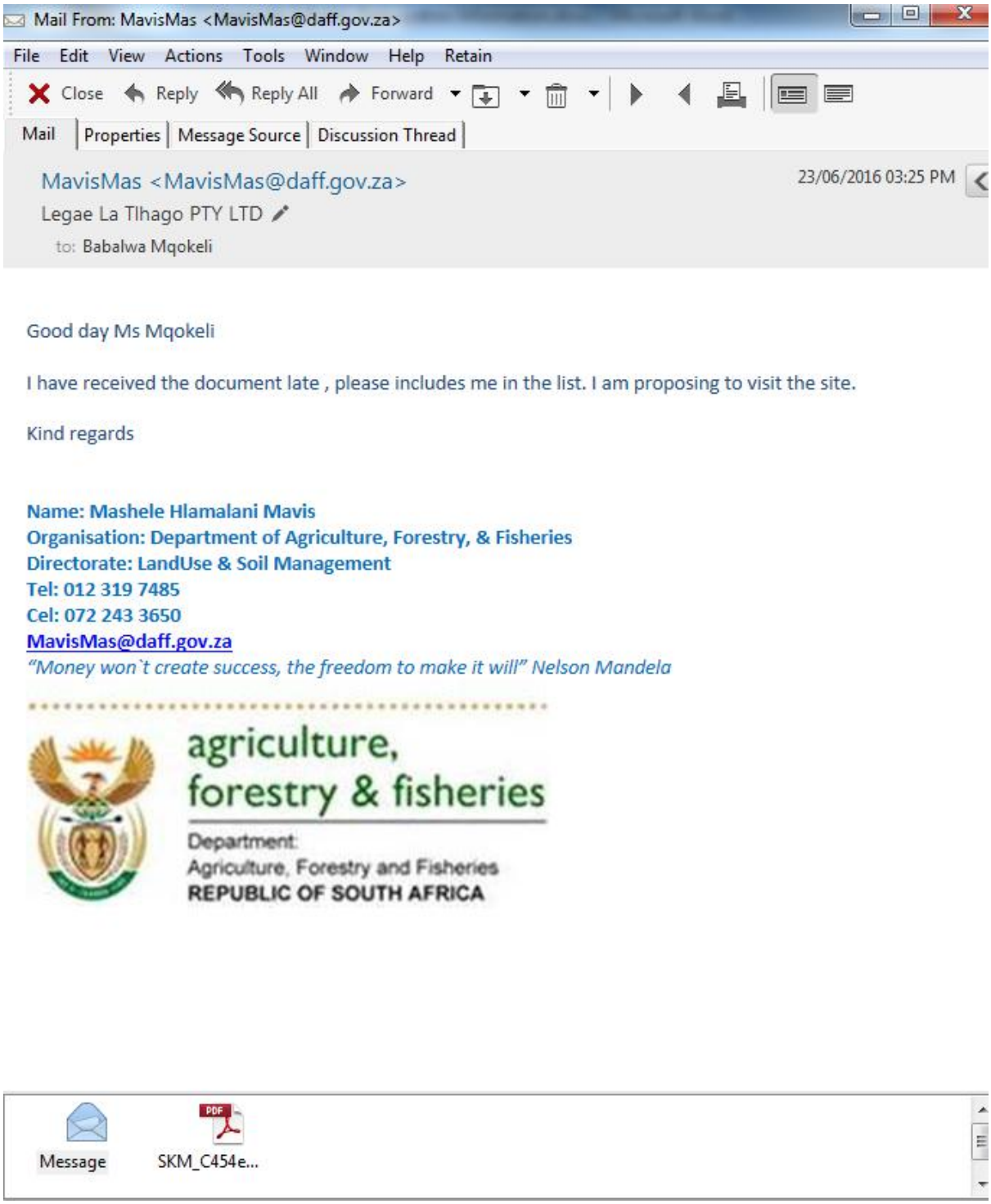
Enquiries can be made to the above postal, fax or e-mail address.

Yours sincerely,

HJ Buys
pp DIRECTOR: LAND USE AND SOIL MANAGEMENT

http://www.agis.agric.za/agriland

4.


Mail From: MavisMas <MavisMas@daff.gov.za>
File Edit View Actions Tools Window Help Retain
Close Reply Reply All Forward
Mail Properties Message Source Discussion Thread
MavisMas <MavisMas@daff.gov.za>
23/06/2016 03:25 PM
Legae La Tlhago PTY LTD
to: Babalwa Mqokeli
Good day Ms Mqokeli
I have received the document late , please includes me in the list. I am proposing to visit the site.
Kind regards
Name: Mashele Hlamalani Mavis
Organisation: Department of Agriculture, Forestry, & Fisheries
Directorate: LandUse & Soil Management
Tel: 012 319 7485
Cel: 072 243 3650
MavisMas@daff.gov.za
"Money won`t create success, the freedom to make it will" Nelson Mandela
agriculture,
forestry & fisheries
Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA
Message
SKM_C454e...

5.

Basic Assessment for Legae La Tlhago (Pty) Ltd's proposed expansion of a Pig Production Enterprise on Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.

08 April 2016
CSIR Reference Number: CSIR/02100/EMS/IR/2016/0002/A

COMMENT AND REGISTRATION FORM

Name: Ms Masmela Mavis	
ID no:	**Telephone:** 012 319 7485
Organisation: DEPT AGRICULTURE, FORESTRY	**Fax:**
Position: RESOURCE AUDITOR	**Email:** MavisMas@dagff.gov.za
Physical address: CNR ANNE BOTHA & XUMIONI STREET DELPEN BUILDINGS	**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	✓
NO	

Please indicate if you have any interest (business, financial, personal or other) in the application for Environmental Authorisation:

Please describe any issues or concerns you may have regarding the proposed project, which you think should be considered during the Basic Assessment Process.

As CARA administrator, during Dabushing in order to extend the piggery facility the might be soil erosion. I will also prefer to visit the site.

Please provide details of any other individuals or organisations that should be registered as I&APs:

Please complete this Comment and Registration Form and submit it to:

Ms. Babalwa Mqokeli
P O Box 320,
Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
E-mail: bmqokeli@csir.co.za

(In response to Basic Assessment Report)

6.

agriculture and rural development
Department: Agriculture and Rural Development
GAUTENG PROVINCE

11 Diagonal, Diamond Building, Newtown, Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 240-2500
Fax: (011) 240-2700
Website: http://www.gdard.gpg.gov.za

Reference:	002/16-17/I0003
Enquiries:	Faith Mlambo
Telephone:	(011) 240-3053
Email:	Faith.mlambo@gauteng.gov.za

Council for Scientific and Industrial Research

Email/Fax. bmqokeli@csir.co.za / mlevendal@csir.co.za

Dear Sir / Madam

Application for Integrated Environmental Authorisation & Draft Basic Assessment Report: Proposed Legae La Tlhago's proposed expansion of a production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria

The Department acknowledges having received the Integrated BA Application & Draft Basic Assessment Report for environmental authorisation integrated of the above-mentioned project on 09/09/2016 but final amendments were made on 21/09/2016.

You are required to submit five (5) copies (3 full colour hard copies and 2 CDs-PDF) of the Final Basic Assessment Report.

Please draw the applicant's attention to the fact that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Boniswa Belot
Deputy Director: Strategic Administration Support
Date: 22/09/2016
CC: Legae La Tlhago (Pty) Ltd

Att: T Mokwena
Email/Fax: mokwena@gmail.com

7.

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Diamond Building, 11 Diagonal Street, Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 240-2500
Fax: (011) 240-2700
Website: http://www.gdard.gpg.gov.za

FAX COVER SHEET

Receiver's Details		Sender's Details	
To:	Babalwa Mqokeli	From:	Khaka Khaka
Company:	Council for Scientific and Industrial Research	Section:	Impact Management
Email	bmqokeli@csir.co.za	Floor:	03 Floor Diamond Building
Tel no.	021 888 2432	Tel:	(011) 240 3420
Fax no.	021 888 2473		
Date:	2016	Pages:	4 pages including the fax cover
SUBJECT:	GAUT: 002/16-17/I0003 **COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED EXPANSION OF A PIG PRODUCTION ENTERPRISE ON PLOT 684, WINTERVELDT AGRICULTURAL HOLDINGS, CITY OF TSHWANE METROPOLITAN MUNICIPALITY**		

CC: City of Tshwane Metropolitan Municipality

Attn: Rudzani Mukheli
Tel: 012 358 8731
Fax: 012 358 8934

GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Reference: Gaut 002/16-17/I0003
Enquiries: Khaka Khaka
Telephone: 011 240 3392
E-mail: Khaka.Khaka@gauteng.gov.za

BY EMAIL: bmqokeli@csir.co.za

BY FASCIMILE: 021 888 2473

Council for Scientific and Industrial Research
P.O Box 320
STELLENBOSCH
7599

Telephone: 021 888 2432

Dear Sir/Madam

COMMENTS ON THE DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED EXPANSION OF A PIG PRODUCTION ENTERPRISE ON PLOT 684, WINTERVELDT AGRICULTURAL HOLDINGS, CITY OF TSHWANE METROPOLITAN MUNICIPALITY

The Draft Basic Assessment Report (BAR) regarding the above-mentioned development received by the Department on 29 September 2016 has reference.

The proposal entails the expansion of a pig production enterprise on afore-mentioned site. The development will comprise of Boar House, Farrowing House, Weaner House, Grower House, 50m³ Waste dam and 31.25m³ Waste dam. The proposed development entails activities that are listed as Activity 27 and Activity 39 of Listing Notice 1 of the Environmental Impact Assessment Regulations 2014, promulgated in terms of sections 24 (5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended). The size of the subject property measures 8 hectares in extent however the development footprint measures 2.021 hectares in extent.

The Department will like to comment as follows:

1. **Alignment of the activity with applicable legislations and policies**

The activities applied for comply with the relevant legislation as outlined in Section A (2) of BAR:

- National Environmental Management Act, 1998 (Act No. 107 of 1998).
- National Water Act, 1998 (Act No. 36 of 1998).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
- National Heritage Resources Act, 1999 (Act 25 of 1999).
- Environmental Impact Assessment Regulations of 2014 (GN R. 982 - 985).
- City of Tshwane Metropolitan Municipality: IDP and SDF.

11 Diagonal Street, Diamond Building, Newtown, Johannesburg, 2000. Tel: 011 240 25000, Fax: 011 240 2700
Website: www.gdard.gpg.gov.za

2. Guidelines GDARD requirements

The Fauna and Flora Specialists studies and Wetland Specialist Studies are required for this development.

3. Alternatives

The alternatives that were considered beside the proposal for this development is as follows:

- Design or Layout Alternative – The proposed design and layout of the activity is more of a biosecurity measure, allows for more effective management of pork production as it lessens the risk of the pigs catching diseases if the activity is in a more prone or exposed location.
- Technology Alternative – The proposed technology to be used complies with pig farming standards.

4. Significant rating of impacts

The rating of impacts included in the BAR is considered adequate but the final BAR should expand further on these to ensure that an informed decision is made by the Department.

5. Locality map and layout plans or facility illustrations

This Department is satisfied with the locality and layout maps provided in the BAR. On submission of the Final Basic Assessment Report (BAR), the below aspects must be taken into account with regards to the Locality and Layout Map:

- **The Locality Map**
  - The scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.
  - The locality map and all other maps are in colour.
  - Locality map must show property boundaries and numbers within 100m of the site.
  - For gentle slopes the 1m 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.
  - Areas with indigenous vegetation (even if it is degraded or infested with alien species).
  - Locality map must show exact position of development site or sites.
  - Locality map shows and identifies (if possible) public and access roads.
  - The current land use as well as the land use zoning of each of the properties adjoining the site or sites.

- **The layout plan**

The layout plan is printed in colour and is overlaid with a sensitivity map (if applicable); layout plan is of acceptable paper size and scale, e.g.

- A4 size for activities with development footprint of 10sqm to 5 hectares.
- A3 size for activities with development footprint of > 5 hectares to 20 hectares.
- A2 size for activities with development footprint of >20 hectares to 50 hectares).
- A1 size for activities with development footprint of >50 hectares).
  - layout plan scales should be guided by the following:
    - A0 = 1: 500
    - A1 = 1: 1000
    - A2 = 1: 2000
    - A3 = 1: 4000
    - A4 = 1: 8000 (±10 000)

- Layout plan must show the position of services, electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure and existing telecommunication infrastructure (where possible).
- Servitudes indicating the purpose of the servitude.
- Sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto):
  - Rivers and wetlands.
  - The 1:100 and 1:50 year flood line (where applicable.
  - Cultural and historical features (where applicable).

6. EMPr

It is important to note that the EMPr included must be practical, site specific and easily enforceable.

7. Public participation process

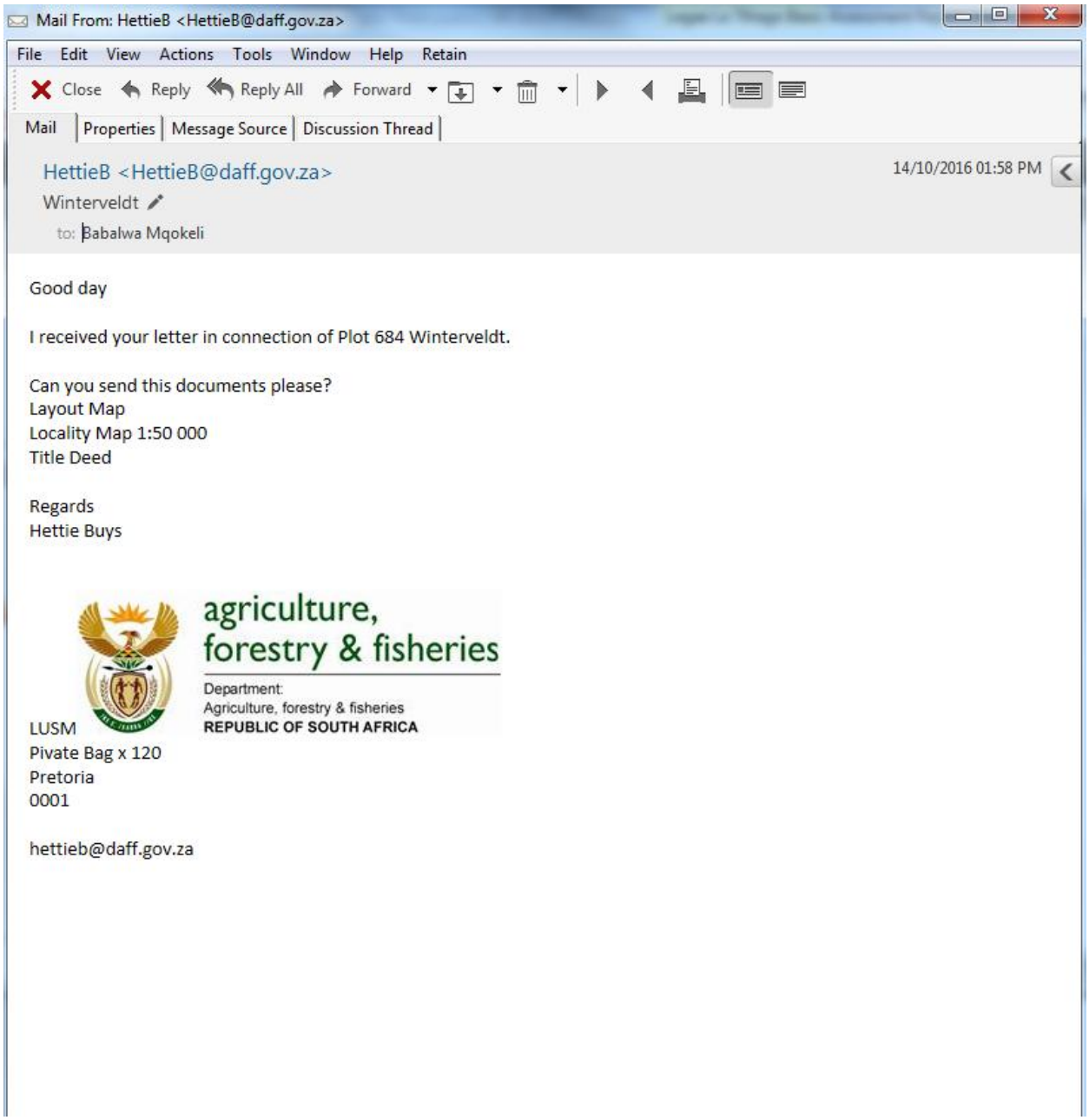
The public participation process must be conducted according to Chapter 6 of the Environmental Impact Assessment Regulations, 2014, (GN R982) published under the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998, as amended). All public participation information including, but not limited to, proof of consultation and comments from key stakeholders, site notice, written notice, newspaper advertisement, comments and responses report must be attached in the appropriate Appendices in the Final Basic Assessment Report.

If you have any queries regarding this letter, contact the official at the contact details provided.

Yours faithfully

Mr. Teboho Leku
Acting Director: Impact Management
Date: 11/10/2016

8.



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HettieB <HettieB@daff.gov.za> 14/10/2016 01:58 PM

Winterveldt

to: Babalwa Mqokeli

Good day

I received your letter in connection of Plot 684 Winterveldt.

Can you send this documents please?
Layout Map
Locality Map 1:50 000
Title Deed

Regards
Hettie Buys

agriculture, forestry & fisheries

Department:
Agriculture, forestry & fisheries
REPUBLIC OF SOUTH AFRICA

LUSM
Pivate Bag x 120
Pretoria
0001

hettieb@daff.gov.za

9.

CITY OF TSHWANE
IGNITING EXCELLENCE

Environmental Management Services Department

Room 200 | 2nd Floor | Old Mercedes Benz Building | 11 Francis Baard Street | Pretoria | 0002
PO Box 1454 | Pretoria | 0001
Tel: 012 358 2449 / 012 358 1351 | Fax: 012 358 4999
Email: mthobeli@tshwane.gov.za | www.tshwane.gov.za | www.facebook.com/CityOf Tshwane

My ref: 8/4/R/1
Your ref:
Contact person: T Mphephu
Section: Environmental Planning & Open Space Management Section

Tel: 012 358 8667
Fax: 012 358 8934
Email: TshinyadzoM@tshwane.gov.za
Date: 28 October 2016

Council for Scientific and Industrial Research (CSIR)
P O Box 320,
Stellenbosch,
7599

Attention: Ms. Babalwa Mqokeli
Tel: (021) 888 2432
Fax: (021) 888 2693
Email: bmqokeli@csir.co.za

Dear Sir/Madam

DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED EXPANSION OF A PIG PRODUCTION ENTERPRISE FOR LEGAE LA TLHAGO (PTY) LTD ON PLOT 684 WINTERVELDT AGRICULTURAL HOLDINGS IN WINTERVELDT, GAUTENG.

The above application dated September 2016 refers.

1. INTRODUCTION

The Environmental Management Services Department (the Department) has considered the Draft Basic Assessment Report dated September 2016 in respect of the abovementioned application. The Draft Basic Assessment Report is submitted to the Environmental Management & Parks Division of the City of Tshwane, hereafter referred to as 'the City', as a commenting authority as required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 04 December 2014. The application is made in terms of the National Environmental Management: Waste Act No. 58 of 2008 (NEMA: WA) GN 921 of 29 November 2013.

2. PROJECT LOCATION AND DESCRIPTION

The Council for Scientific and Industrial Research (CSIR) has been appointed by the Legae La Tlhago (Pty) Ltd to undertaken the required Basic Assessment Report process for the proposed project. Legae La Tlhago (Pty) Ltd is a small-scale pig and vegetable farming enterprise located on an 8 hectare farm on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. The Legae La Tlhago (Pty) Ltd propose to expand the Pig Farming division of the enterprise by developing a 1.05 ha pig facility, with a throughput of 1049 pigs, as well as two waste dams measuring 50m3 and

31.25m3. The current operations of the business comprise of a 10 sow piggery and cultivation of vegetables.

The proposed infrastructure of the piggery upon completion will entail the following:

- 1 x Boar house
- 1 x Farrowing house
- 1 x Weaner house
- 1 x Grower house
- 1 x 50m3 Waste dam
- 1 x 31.25m3 Waste dam (overflow dam for re-use of waste water)

The activity entails undertaking the following listed activity in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Environmental Impact Assessment Regulations, 04 December 2014, under:

GNR 983, 4 December 2014

- *Activity 27 The clearance of an area of 1 hectare or more, but less than 20 hectares, of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (iii) The undertaking of a linear activity; or (iv) Maintenance purposes undertaken in accordance with a maintenance management plan.*

- *Activity 39: The expansion and related operation of facilities for the concentration of animals for the purpose of commercial production in densities that will exceed- (ii) 8 square meters per small stock unit, where the expansion will constitute more than; (b) 250 additional pigs, excluding piglets that are not yet weaned.*

In terms of the National Environmental Management (NEM): Waste Act Regulations published in GNR 921 on the 29 November 2013 Government Gazette No 37083, Waste Management License is required as the project applies to the following listed activities:

Category A

- *Activity (1) the storage of general waste in lagoons.*
- *Activity (12): The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).*

3. KEY FACTORS INFORMING THE COMMENTS

In making its comments in respect of the proposed activity the Department has taken, inter alia, the following into consideration:

a) The information contained in the final Basic Assessment Report compiled by Council for Scientific and Industrial Research (CSIR) dated September 2016 and received by the Department on 09 September 2016.

b) Information obtained from the Departments' s information base including *inter alia*:
    - Geographic Information System (GIS data).
    - Gauteng Open Space Plan (GOSP).

c) Compliance with applicable Municipal, provincial and national policies and guidelines including:

- The National Environmental Management Act 1998 (Act 107 of 1998) (NEMA): its decision-making principles and Environmental Impact Assessment Regulations;
- The Tshwane Integrated Environmental Policy (TIEP);
- The Tshwane Open Space Framework (TOSF) Policy Statements and Typologies.
- The Bioregional Plan for the Gauteng Metropolitan Municipalities.
- The Gauteng Provincial Environmental Management Framework (GPEMF)

4. DISCUSSION

In reviewing the application the Department made the following findings:

a) According to the Bioregional Plan for the Gauteng Metropolitan Municipalities the proposed site is situated within following:
   - ***Other Natural Area:*** *Natural areas not included in the Protected, Critical Biodiversity and Ecological Support Areas categories.*
   - ***No natural remaining:*** *These areas include cultivated areas (intensive agriculture), plantations, mined areas, urban areas, infrastructure and dams.*

b) According to the Gauteng Provincial Environmental Management Framework (GPEMF) November 2014 the southern part of the proposed development site is situated within **Zone 4: Normal control zone.** This zone is dominated by agricultural uses outside the urban development zone as defined in the Gauteng Spatial Development Framework. No listed activities may be excluded from environmental assessment requirements in this zone.

c) The report indicates that no other additional location alternatives have been proposed for the project as this is the only site available for the applicant, which forms part of an existing development, with the farm also limited in terms of size.

d) The report indicates that the preferred proposed layout is on part of the property which has the least impact on the environment and is away from the wetland seep on site.

e) The report indicates that the proposed technology to be used complies with pig farming standards, and will advocate pig welfare and best practices in pig production and the proposed technologies will follow South African Pork Producers' Organisation (SAPPOs) guidelines in terms of best practices associated with pig farming.

f) The report indicates that solid waste generated during the operational phase will be stored in suitable bins and transported to the nearest licenced disposal site.

g) The report indicates that medical waste such as needles will be disposed of through existing medical waste streams in the area.

h) The report indicates that pig waste will be stored in the slurry dam and used as fertilizer in the agricultural activities on site.

i) The report indicates that the suspended solid pig waste will be collected and stored on a concrete surface and composted.

j) The report indicates that the proposed layout is also regarded as a biosecurity measure to ensure that there is no unauthorised access to the site and ultimately the piggery, including the entry of other animals, thus preventing the potential of pests and transmission of infectious vectors that could pose a threat to the health of the pigs.

k) The indicates that the proposed activity will require the use of approximately 50 kilolitres per day to be obtained from ground water sources and an existing tank. Therefore a water use licence is required for the facility as it triggers Section 21(a) and (b) of the National Water Act 36 of 1998 (NWA).

l) The report indicates that the surrounding area does not have municipal water and therefore relies on extracting water from boreholes and surface water storage.

m) The Provincial Heritage Resources Authority recommends that a Heritage Impact Assessment should be conducted during the EIA process. However, the letter of request for Exemption from further heritage impact studies has been requested by ASHA consulting. The response Provincial Heritage Resources Authority should be submitted as part of the final Basic Assessment Report (BAR).

n) The Ecological Scan & Wetland Delineation Report indicates that a seep wetland was identified on the boundary of the site. Seeps are a wetland area located on gently to steeply sloping land and dominated by colluvial, unidirectional movement of water and material down-slope.

o) The Ecological Scan & Wetland Delineation Report indicates that the significance of most impacts on site from an ecological perspective is considered to be of Low Significance.

p) The Ecological Scan & Wetland Delineation Report concludes that based on the information available to date, with the brief field scan of the site, it is NSS's opinion that there are no fatal flaws to the project and that provided the mitigation set out is adhered to includes moving out of the wetland and associated buffer as well as not encroaching the *Open Acacia Sandy Bushveld* area.

5. RECOMMENDATIONS

The Department recommends that the following issues be taken into consideration:

a) The Gauteng Provincial Environmental Management Framework (GPEMF) November 2014 provides the following guidelines which are applicable in within Zone 4: Normal control zone:
   - *The management of stormwater to prevent flooding must be done in accordance with the requirements of the relevant municipal engineer, and in accordance with Department of Water and Sanitation (DWS) requirements, which must ensure that additional runoff water is stored and released at a rate that will not impact negatively (not be more than before the development activity) on the natural flow capacity of rivers and streams.*

   The applicant must ensure that a site specific Stormwater Management Plan be compiled and submitted as part of the final Basic Assessment Report (BAR) with the comments and response from City of Tshwane Roads and Stormwater Division

b) The South African Pork Producers' Organisation (SAPPOs) guidelines in terms of best practices should be included in the final Basic Assessment Report to form part of the environmental authorisation. These guidelines should be included as part of the finalised EMP.

c) The response Provincial Heritage Resources Authority should be submitted as part of the final Basic Assessment Report (BAR).

d) The Ecological Scan & Wetland Delineation Report compiled by Natural Scientific Services CC, June 2016 indicates that a seep wetland was identified on the boundary of the site. *Therefore,*

according to mitigation measures developed by GDARD (Department of Agriculture & Rural Development), Biodiversity Management Directorate, indicated that the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone, must be designated as sensitive and the 50m for wetlands occurring outside urban areas is applicable to the study site to ensure healthy functioning and maintenance of wetland ecosystems.

e) All the recommendations and mitigation measures in the report and ecological scan & wetland delineation report in the attached appendix must be adhered to and implemented as part of the design and planning phases of the proposed development.

f) An integrated waste management approach must be adopted and implemented which is based on waste minimisation. The recycling, reducing and re-using of waste must be considered as an alternative where appropriate. Solid waste must be disposed of at a registered landfill licensed in terms of the National Environmental Waste Management Act of 2008 (NEM: WA).

g) The pig mortality pit if any should be designed to ensure that detrimental fluids created by the degrading process do not contaminate or percolate into the surrounding soil or water table. An emergency plan for the mortality pit should be included within the section for emergency plan within the final BAR.

h) The Water Quality Monitoring Plan, the Soil and Sludge Monitoring Method should be included as part of the finalised EMP.

6. CONCLUSION

The Department will provide final comments upon receipt and review of the final Basic Assessment Report with the inclusion of the above-mentioned recommendations.

Yours faithfully,

..... 26/10/31.....

Mr Aluoneswi Mafunzwaini **Date:**
EXECUTIVE DIRECTOR: ENVIRONMENTAL MANAGEMENT AND PARKS DIVISION
Letter signed by: Leloko Puling
Designation: Director: Environmental Planning & Open Space Management

CC Gauteng Department of Agriculture and Rural Development Attn: Mr. Steven Mukhola Tel: (011) 240 2572 Fax: (011) 240 2700

IT'S MY RESPONSIBILITY

Kgoro ya Taolo ya Tikologo • Departement Omgewingbestuur • Lefapha la Tsamaiso ya Tikologo
Ndzawulo ya Mafambiselo ya swo Hlanga • UMnyango Wezokuphathwa Kwemvelo
Environmental Management Department

10.

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Babalwa Mqokeli 18/11/2016 09:36 AM

RE: H51-16. Legae La Tlhago - Proposed expansion of a Pig Production Enterprise, Winterveldt, Pretoria

to: Tebogo Molokomme(GPSPORTS)

Dear Tebogo

I trust you are well.

I would like to request that once the committee has made a decision with regards to this project, that a response could also be forwarded directly to the Gauteng Department of Agriculture and Rural Development, as well as the City of Tshwane.

The forwarding addresses are as follows:

GDARD (Project Reference = **GAUT: 002/16-17/10003**):
Mr Nhlanhla Makhathini

Gauteng Department of Agriculture and Rural Development

11 Diagonal Street, Diamond Building

Newtown

Johannesburg

2000

Tel: 011 240 3052

City of Tshwane (Project Reference = **8/4/R/1**):

Ms Rudzani Mukheli

City of Tshwane Metropolitan Municipality

4th Floor, Old Mercedes Benz Building

11 Francis Baard Street

Pretoria

0001

Tel: 012 358 8731

Please could you forward me your courier address.

>>> Babalwa Mqokeli 17/11/2016 07:59 >>>
Dear Tebogo

Noted, thank you.

Please forward me your courier address.

Kind Regards,
Babalwa

>>> "Tebogo Molokomme(GPSPORTS)" <Tebogo.Molokomme@gauteng.gov.za> 16/11/2016 17:23 >>>
Dear Babalwa

Please note that the decision on the application can only be made by the Committee. It is meeting next week, Friday, 25 November.

In the meantime, please send us the hard copy of the report.

Kind Regards,
Tebogo Molokomme

Statutory Bodies: Provincial Heritage Resources Authority: PHRA-G
Gauteng Department of Sport, Arts, Culture & Recreation
Tel: 011 355 2545
Web: www.gautengonline.gov.za | www.sacr.gpg.gov.za

From: Babalwa Mqokeli [BMqokeli@csir.co.za]
Sent: Wednesday, 16 November 2016 11:00 AM
To: Tebogo Molokomme(GPSPORTS)
Cc: Noluthando Cembi(GPSPORTS)
Subject: Re: H51-16. Legae La Tlhago - Proposed expansion of a Pig Production Enterprise, Winterveldt, Pretoria

Good morning

I have been trying to get hold of you several times with regards to PHRA-G's response on the letter requesting an HIA exemption.

Please find the attached aforementioned letter, included in the Draft Basic Assessment (BA) that was released on the 9th September 2016.

Kindly revert urgently as I am finalising the BA Report and would like to include the reponse in the BA Report.

Many thanks,

Appendix E5: Minutes of any public and/or stakeholder meetings – Not Applicable

Appendix E6: Comments and Responses Report

***Please note that the comments are taken in verbatim from the comments provided by Interested and Affected Parties**

Comments received following the project announcement on 18 March 2016 (prior to the release of the Draft Basic Assessment Report)

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
SANRAL will not be affected by the proposed development as no National Road will be affected. Please remove SANRAL on the mailing list for this project. Should any National Road be affected in the future kindly contact us	Victoria Bota South African National Roads Agency	12 April 2016	Thank you for your comment, it is noted.
DAFF has received your background information document for the **Proposed expansion of a Pig production enterprise on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.** Could you kindly forward the above mentioned document to Mr Izak van der Merwe, izakvdm@daff.gov.za.	Nomvuyo Nkotha Intern - Department of Agriculture, Forestry and Fisheries	22 April 2016	Thank you for your comment, and the BID was forwarded to Mr Izak van der Merwe.
This serves as a notice of receipt and confirms that your application has been captured in our electronic AgriLand tracking and management system. It is strongly recommended that you use the on-line AgriLand application facility in future. Detail of your application as captured: Application type: Applicability Your reference**:** Property Description: Plot 684 Winterveldt AH Dated: 8 April 2016 Please use the following reference number in all enquiries: AgriLand reference number: 2016_06_0030	HJ Buys Director: Land Use and Soil Management DAFF	07 June 2016	Thank you for your comment, it is noted.

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
Enquiries can be made to the above postal, fax or e-mail address.			
As CARA administrator, during debushing in order to extend the piggery facility there might be soil erosion. I will also prefer to visit the site.	Hlamalani Mavis Mashele Resource Auditor DAFF: Land Use & Soil Management Directorate		Thank you for your comment. 1. In terms of erosion potential, it has been addressed in the specialist report attached as Appendix G and an erosion management plan has been included in the Draft EMPr which is attached as Appendix H. 2. In terms of the site visit, Ms Mashele can make arrangements with the farm owner, and contact details of the farm owner were provided via email.

Appendix E7: Comments from I&APs on Basic Assessment (BA) Report

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
The Department acknowledges having received the Integrated BA Application & Draft Basic Assessment Report for environmental authorisation integrated of the above-mentioned project on 09/09/2016 but final amendments were made on 21/09/2016. You are required to submit five (5) copies (3 full colour hard copies and 2 CDs-PDF) of the Final Basic Assessment Report. Please draw the applicant's attention to the fact that the activity may not commence prior to an environmental authorisation being granted by the Department.	Boniswa Belot GDARD: Deputy Director: Strategic Administration Support	22 September 2016	Thank you for the acknowledgement and comment, it is noted.
The Draft Basic Assessment Report regarding the above-mentioned development received by the Department on 29 September 2016 has reference.	Mr. Teboho Leku Acting Director:	11 October 2016	Thank you to the Department for the comments provided. Response to the Department comments:

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
The proposal entails the expansion of a pig production enterprise on afore-mentioned site. The development will comprise of Boar House, Farrowingf House, weaner House, Grower House, 50m^3 Waste dam and 31.25m^3 Waste dam. The proposed development entails activities that are listed as Activity 27 and Activity 39 of Listing Notice 1 of the Environmental Impact Assessment Regulations 2014, promulgated in terms of sections 24 (5) and 44 of the National Environmental Management Act, 1988 (Act No. 107 of 1998, as amended). The size of the subject property measures 8 hectaer in extent however the development footprint measures 2.021 hectares in extent. The Department will like to comment as follows: **1. Alignment of the activity with applicable legislations and policies** The activities applied for comply with the relevant legislation as outlined in Section A (2) of BAR: • National Environmental Management Act, 1998 (Act No. 107 of 1998). • National Water Act, 1998 (Act No. 36 of 1998). • National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004). • National Heritage Resources Act, 1999 (Act No. 25 of 1999). • Environmental Impact Assessment Regulations of 2014 (GN R. 982 – 985). • City of Tshwane Metropolitan Municipality: IDP and SDF	Impact Management		1. Comment is correct and noted. 2. Comment noted and complied with. The required studies were undertaken and the report produced thereof is included in this BAR as **Appendix G**. 3. Comment is correct and noted. 4. Thank you for the comment. As recommended by the Department, the rating of impacts have been revised and detailed in **Section E (Table 2-1)**. 5. Comment noted. Project maps included in **Appendix A**. 6. Comment noted and complied with. 7. Comment noted. The issues raised and comments received from I&APs and key departments were captured in the Issues and Responses Trail and addressed in this finalised BA Report, where required and as applicable (**Appendix E6** of the BA Report, i.e this chapter). The comments raised by stakeholders, I&APs and Organs of State have been retained in the BA Report and updated responses have been provided where applicable. Proof of correspondence sent to registered I&APs and stakeholders during the Project Initiation and Scoping Phases is included in Appendix E of this EIA Report. All correspondence sent by I&APs during the Project Announcement Phase (i.e. prior to the release of the Draft BA Report) and during the 30-day review of the Draft BA Report and after the review period are included in **Appendix E** of this BA Report.

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
2. Guidelines GDARD requirements The Fauna and Flora Specialists Studies and Wetland Specialist Studies are required for this development. **3. Alternatives** The alternatives that were considered beside the proposal for this development is as follows: • Design or Layout Alternative - The proposed design and layout of the activity is more of a biosecurity measure, allows for more effective management of pork production as it lessens the risk of the pigs catching diseases if the activity is in a more prone or exposed location. • Technology Alternative - The proposed technology to be used complies with pig farming standards. **4. Significant rating of impacts** The rating of impacts included in the BAR is considered adequate but the final BAR should expand further on these to ensure that an informed decision is made by the Department. **5. Locality map and layout plans or facility illustrations** This Department is satisfied with the locality and layout maps provided in the BAR. On submission of the Final Basic Assessment Report (BAR), the below aspects must be taken into account with regards to the Locality and Layout Map: ▪ **The Locality Map** ➢ The scale of locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a			The PPP for this BA Process is being undertaken in compliance with the 2014 EIA Regulations.

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map. ➢ The locality map and all other maps are in colour. ➢ Locality map must show property boundaries and numbers within 100m. ➢ For gentle slopes the 1m contour intervals must be indicated on the map and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the map. ➢ Areas with indigenous vegetation (even if it is degraded or infested with alien species). ➢ Locality map must show exact position of development site or sites; ➢ Locality map showing and identifying (if possible) public and access roads; and ➢ The current land use as well as the land use zoning of each of the properties adjoining the site or sites. ▪ **The layout plan** The layout plan is printed in colour and is overlaid with a sensitivity map (if applicable); layout plan is of acceptable paper size and scale, e.g. o A4 size for activities with development footprint of 10sqm to 5 hectares. o A3 size for activities with development footprint of > 5 hectares to 20 hectares. o A2 size for activities with development footprint of >20 hectares to 50 hectares). o A1 size for activities with development footprint of >50 hectares). - layout plan scales should be guided by the following:			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
▪ A0 = 1: 500 ▪ A1 = 1: 1000 ▪ A2 = 1: 2000 ▪ A3 = 1: 4000 ▪ A4 = 1: 8000 (±10 000) - Layout plan must show the position of services, electricity supply cables (indicate above or underground), water supply pipelines, boreholes, sewage pipelines, septic tanks, storm water infrastructure and existing telecommunication infrastructure (where possible). - Servitudes indicating the purpose of the servitude. - Sensitive environmental elements on and within 100m of the site or sites (including the relevant buffers as prescribed by the competent authority) including (but not limited thereto): • Rivers and wetlands. • The 1:100 and 1:50 year flood line (where applicable). • Cultural and historical features (where applicable). **6. EMPr** It is important to note that the EMPr included must be practical, site specific and easily enforceable. **7. Public participation process**			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
The public participation process must be conducted according to Chapter 6 of the Environmental Impact Assessment Regulations, 2014, (GN R982) published under the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998, as amended). All public participation information including, but not limited to, proof of consultation and comments from key stakeholders, site notice, written notice, newspaper advertisement, comments and responses report must be attached in the appropriate Appendices in the Final Basic Assessment Report. If you have any queries regarding the contents of this letter, contact the official at the contact details provided.			
I received your letter in connection of Plot 684 Winterveldt. Can you send this documents please? Layout Map Locality Map 1:50 000 Title Deed	HJ Buys Director: Land Use and Soil Management DAFF	14 October 2016	Please find the attached requested maps. (Included as **Appendix A** of this report). Kindly contact the applicant (Legae La Tlhago representative) who is cc'd in this email, or alternatively the Registrar of Deeds with regards to the Title Deed. Please let me know if you require further information.
In reviewing the application the Department made the following findings: a) According to the Bioregional Plan for the Gauteng Metropolitan Municipalities the proposed site is situated within following: • **Other Natural Area**: Natural areas not included in the Protected, Critical Biodiversity and Ecological Support Areas categories. • **No natural remaining**: These areas include	Mr. Aluoneswi Mafunzwaini Executive Director: Environmental Management and Parks Division City of Tshwane Metropolitan Municipality	31 October 2016	Thank you to the Department for the comments provided. As per the findings of the Department, in points a) – p), this information is noted and correct. **Response to Section 5 (Recommendations):** a) Stormwater management measures have been included in the Final EMPr attached as Appendix H. Recommendations for stormwater management will be considered by the Applicant

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
cultivated areas (intensive agriculture), plantations, mined areas, urban areas, infrastructure and dams. b) According to the Gauteng Provincial Environmental Management Framework (GPEMF) November 2014 the proposed activity is situated Within **Zone 4**: **Normal control zone**. This zone is dominated by agricultural uses outside the urban development zone as defined in the Gauteng Spatial Development Framework. No listed activities may be excluded from environmental assessment requirements in this zone. c) The report indicates that no other additional location alternatives have been proposed for the project as this is the only site available for the applicant, which forms part of an existing development, with the farm also limited in terms of size. d) The report indicates that the preferred proposed layout is on part of the property which has the least impact on the environment and is away from the wetland seep on site. e) The report indicates that the proposed technology to be used complies with pig farming standards, and will advocate pig welfare and best practices in pig production and the proposed technologies will follow SAPPOs guidelines in terms of best practices associated with pig farming. f) The report indicates that solid waste generated during the operational phase will be stored in suitable bins and transported to the nearest licensed disposal site.			during the design, construction and operation phase, as applicable and where possible. b) Guidelines referred to are best practice recommendations that are provided by the South African Pork Producers' Organisation (SAPPO) on their website: ***http://www.sapork.biz/***. An extract of these best practice standards is included in **Appendix I**, refer to the website for a full set of recommendations on ***http://www.sapork.biz/functions/emerging-farmers/***. The applicant is implementing these recommendations at the existing piggery facility and the farm manager has done a course provided by SAPPO's Learning Academy, to ensure the current and proposed facility is aligned to these best practice standards. c) In terms of the response from Provincial Heritage Resources Authority–Gauteng (PHRA-G), the Authority has not responded at the time of release of this report. Following to an enquiry in this regard, PHRA-G has indicated that the decision on the application can only be made by the Committee to be held on the 25th of November 2016. CSIR has asked PHRA-G to forward their response directly to GDARD and CoT (please refer to correspondence **10** of **Appendix E7** as proof of this correspondence). The official status on the SAHRIS website however indicates that the project is approved and follow ups have been made to obtain official confirmation in this regard. d) Noted and correct. The 50m buffer is adhered to in the layout plan and is indicated in the updated map referred to as **Map 1B** included in **Appendix A**. e) Recommendation noted. f) Recommendation noted and will be adhered to. The recommendation is included in the EMPr as part of the mitigation measures that need to be implemented to minimise waste. The relevant requirements of the National

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
g) The report indicates that medical waste such as needles will be disposed of through existing medical waste streams in the area. h) The report indicates that pig waste will be stored in the slurry dam and used as fertilizer in the agricultural activities on site. i) The report indicates that the suspended solid pig waste will be collected and stored on a concrete surface and composted. j) The report indicates that the proposed layout is also regarded as a biosecurity measure to ensure that there is no unauthorised access to the site and ultimately the piggery, including the entry of other animals, thus preventing the potential of pests and transmission of infectious vectors that could pose a threat to the health of the pigs. k) The report indicates that the proposed will require the use of approximately 50 kilolitres per day to be obtained from ground water sources and an existing tank. Therefore a water use licence is required for the facility as it triggers Section 21(a) and (b) of the National Water Act 36 of 1998 (NWA). l) The report indicates that the surrounding area does not have municipal water and therefore relies on extracting water from boreholes and surface water storage. m) The Provincial Heritage Resources Authority recommends that a Heritage Impact Assessment should be conducted during the EIA process. However, the letter of request for Exemption from further heritage impact studies has been requested by ASHA consulting. The response from Provincial			Environmental Management: Waste Act (Act 59 of 2008) regarding the handling, storage, transport and use of hazardous waste will be adhered to. As noted in the EMPr, all waste will be safely stored, and will be removed from site on a scheduled basis by an appointed contractor. The recycling and re-use of waste will be considered as an alternative where possible. The waste, where applicable, will be disposed at a licenced municipal landfill site. g) Recommendation noted. Mitigation measures to be taken in handling pig mortalities have been included in the EMPr. An Emergency Plan must be developed to deal with outbreaks of diseases in consultation with a veterinarian. h) Recommendation noted. A proposed management of water quality, as well as a soil and sludge management method has been included in the EMPr. The application of sludge/wastewater onto land for agricultural practices is a recognised practice. Its' application must however be managed and in adherence to the Guidelines for the Utilisation and Disposal of Wastewater Sludge.

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
Heritage Resources Authority should be submitted as part of the final Basic Assessment Report (BAR). n) The Ecological Scan & Wetland Delineation Report indicates that a seep wetland was identified on the boundary of the site. Seeps are a wetland area located on gently to steeply sloping land and dominated by colluvial, unidirectional movement of water and material down-slope. o) The Ecological Scan & Wetland Delineation Report indicates that the significance of most impacts on site from an ecological perspective is considered to be of Low Significance. p) The Ecological Scan & Wetland Delineation Report concludes that based on the information available to date, with the brief scan of the site, it is NSS's opinion that there are no fatal flaws to the project and that provided the mitigation set out is adhered to including moving out of the wetland and associated buffer as well as not encroaching the *Open Acacia Sandy Bushveld* area. . **5. RECOMMENDATIONS** The Department recommends that the following issues be taken into consideration: a) The Gauteng Provincial Environmental Management Framework (GPEMF) November 2014 provides the following guidelines which are applicable in within Zone 4: Normal control zone: • *The management of stormwater to prevent*			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
flooding must be done in accordance with Department of Water and Sanitation (DWS) requirements, which must ensure that additional runoff water is stored and released at a rate that will not impact negatively (not be more than before the development activity) on the natural flow capacity of rivers and streams. The applicant must ensure that a site specific Stormwater Management Plan be compiled and submitted as part of the final Basic Assessment Report (BAR) with the comments and response from City of Tshwane Roads and Stormwater Division. b) The south African Pork Producers' Organisation (SAPPO) guidelines in terms of best practices should be included in the final Basic Assessment Report to form part of the environmental authorisation. These guidelines should be included as part of the finalised EMP. c) The response from Provincial Heritage Resources Authority should be submitted as part of the final Basic Assessment Report (BAR). d) The Ecological Scan & Wetland Delineation Report compiled by Natural Scientific Services CC, June 2016 indicates that a seep wetland was identified on the boundary of the site. *Therefore, according to mitigation measures developed by GDARD (Department of Agriculture & Rural Development), Biodiversity Management Directorate, indicated that the wetland and a protective buffer zone, beginning from the outer edge of the wetland temporary zone,*			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
must be designated as sensitive and the 50m for wetlands occurring outside urban areas is applicable to the study site to ensure healthy functioning and maintenance of wetland ecosystems. e) All the recommendations and mitigation measures in the report and ecological scan & wetland delineation report in the attached appendix must be adhered to and implemented as part of the design and planning phases of the proposed development. f) An integrated waste management approach must be adopted and implemented which is based on waste minimisation. The recycling, reducing and re-using of waste must be considered as an alternative where appropriate. Solid waste must be disposed of at a registered landfill licensed in terms of the National Environmental Waste Management Act of 2008 (NEM:WA). g) The pig mortality pit if any should be designed to ensure that detrimental fluids created by the degrading process do not contaminate or percolate into the surrounding soil or water table. An emergency plan for the mortality pit should be included within the section for emergency plan within the final BAR. h) The Water Quality Monitoring Plan, the Soil and Sludge Monitoring Method should be included as part of the finalised EMP. **6. CONCLUSION** The Department will provide final comments upon receipt and review of the final Basic Assessment Report with the			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
inclusion of the above-mentioned recommendations. A waste management plan should be compiled and submitted as part of the final Basic Assessment Report. The plan should address the collection, transportation, disposal of waste and recycling of recoverable waste if any. i) An Emergency Preparedness Plan should be compiled in consultation with the City of Tshwane Emergency Services Department and approved by a qualified risk consultant. The plan should be submitted as part of the final Basic Assessment Report (BAR). j) Biosecurity measures for proposed piggery should be compiled and included in the final Basic Assessment Report to control contagious pig diseases, especially classical swine fever and foot and mouth disease and should form part of the environmental authorisation. k) The Department is not in support of septic tank systems. It is the recommendation from the Department to evaluate possible alternative sewage systems which are more environmentally acceptable. The septic drain system could easily pollute the groundwater if not properly managed and maintained. l) Detail Designs of the proposed pig houses and slurry dam should be completed and submitted as part of the final Basic Assessment Report. This should be approved by Gauteng Department of Agriculture and Rural Development (GDARD) and Department of Water and Sanitation (DWS). m) Odour Assessment should be undertaken for the			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
proposed activity. The surrounding area is in close proximity of the application site and nuisance from odours should be prevented. n) The treated effluent water used for the purpose of irrigation should at all times adhere to the South African Water Quality Guidelines for Agricultural Use: Irrigation of the Department of Water and Sanitation. o) Disinfecting of the pig sheds inside and outside and daily management and sanitation on floor areas, walls, ceilings and other equipment used for the pig sheds should be implemented regularly, to prevent any air pollution in the form of odours. p) Appropriate damp proofing and drainage precautions must be implemented beneath all effluent storage areas to prevent groundwater pollution. q) The borehole certificate should be included within the final Basic Assessment Report (BAR) confirming capacity of 1500 litres per hour. r) The pig mortality pit if any should be designed to ensure that detrimental fluids created by the degrading process do not contaminate or percolate into the surrounding soil or water table. An emergency plan for the mortality pit should be included within the section for emergency plan within the final BAR. s) All activities on the site must comply with the Tshwane Municipality's By-Laws. t) The EMP as submitted within the report must be amended to address the issues such as odour management, mortality pit, management of nuance			

ISSUES RAISED	COMMENTATOR	DATE	RESPONSE
flies, ground water monitoring, diseases outbreak, maintenance of effluent system and addressing emergency events related to the proposed activity and attached as part of the final BAR. u) All Alien invasive plant species should be eradicated on the study area and within the water course system according to the Conservation of Agricultural Resources Act (Act no. 43 of 1983). An Invasive species control plan should be actively implemented within the study area and Open Space system for at least 12 months (every 3 months) after construction to eradicate existing alien/invader species and prevent any recruited alien vegetation. This must be clearly indicated within the approved EMP. 6. CONCLUSION The Department will provide final comments upon receipt and review of the final Basic Assessment Report with the inclusion of the above-mentioned recommendations.			

Appendix E8: Comments from I&APs on amendments to the BA Report - N/A at this stage of the BA process

Appendix E9: Copy of the register of I&APs

Company/organization	Name	Physical Address	Phone	Postal	Cell	Email	BID + letter 1 + comment form
NATIONAL							
Department of Environmental Affairs- National	Mmatlala Rabothata						email+post
Department of Environmental Affairs- National	Sibusisiwe Hlela						email
Department of Environmental Affairs- National	Takalani Nemarude						email
Department of Rural Development and Land Reform	Bonginkosi Zulu						email+post
Department of Agriculture, Forestry and Fisheries	Mashudu Marubini						email+post
Department of Agriculture, Forestry and Fisheries (AgriLand and Liaison Officer)	Ms Thoko Buthelezi						email+post
National Department of Water Affairs	Ms Ndileka K mohapi						email + post
National Department of Water Affairs	Namisha Muthraparsad						email + post
PROVINCIAL							
Department of Agriculture and Rural Development	Steven Mukhola						email+post
Department of Agriculture and Rural Development	Karabo Mohatla						email+post
Department of Agriculture and Rural Development	Khalele Njoni						post
Department of Agriculture and Rural Development	Phuti Matlamela						email+post
Department of Health	Albert Marumo						email+post

Company/organization	Name	Physical Address	Phone	Postal	Cell	Email	BID + letter 1 + comment form
Department of Water and Sanitation	Ms M Musekene						email+post
Department of Water and Sanitation	Ms T Rakgotho						email+post
Gauteng Department of Infrastructure Development	Bethuel Netshiswinzhe						email+post
Gauteng Department of Economic Development	Phindile Mbanjwa						email+post
The Provincial Heritage Resources Authority Gauteng	Maphata Ramphele						email+post
The Provincial Heritage Resources Authority Gauteng	Tebogo Molokomme						email+post
GDARD waste management	Zingisa Smale						email+post
LOCAL MUNICIPALITY							
City of Tshwane Metropolitan Municipality	Ms Celia M						email+post
City of Tshwane Metropolitan Municipality	Mr Leloko Puling						email+post
City of Tshwane Metropolitan Municipality- Municipal Manager	Jason Ngobeni						post
City of Tshwane Metropolitan Municipality	Ms Rudzani Mukheli						email+post
WARD COUNCILLORS							
Ward 24 Tshwane Councillor	Amos Matome Mampheko						email+post
CLIENT & NEIGHBOURS							
Client	Thabo Mokwena						email
Neighbours	T Sakgwe						email

Company/organization	Name	Physical Address	Phone	Postal	Cell	Email	BID + letter 1 + comment form
Neighbours	T Matjeke						Post letter to Client
OTHER I&APs							
WESSA	Tumi Lehabe						email
EWT	Adam Pires						email+post
EWT	Dr Harriet Davies-Mostert						email+post
Council for Geoscience	Dr Stewart Foya						email+post
Birdlife	Simon Gear						email
South African National Parks (SANParks)	Dr. Howard Hendricks						email+post
South African National Roads Agency	Victoria Bota						email
South African National Roads Agency	Khathutshelo Ramavhoya						email
AgriLand	Anneliza Collett						post
Grasslands Society of South Africa	Feyni Du Toit						post

BASIC ASSESSMENT REPORT

APPENDIX F:
Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

contents

Water Use Licence Authorisation : **Not Applicable at this stage, still in process of applying**.
SAHRA information
Service letters: **Not Applicable**
Water supply information: **Not Applicable**

Provincial Heritage Resources Authority Gauteng Letter

PROVINCIAL HERITAGE RESOURCES AUTHORITY - GAUTENG
PRIVATE BAG X33, JOHANNESBURG, 2000
35 RISSIK STREET, SURREY HOUSE
JOHANNESBURG, 2000
TEL: 011 355 2500

Our Ref : H51/16
Enquiries : Tebogo Molokomme
Date : 03 June 2016

CSIR: Ms Babalwa Mqokeli
Tel: 021 888 2432
E-mail: bmqokeli@csir.co.za

Dear Sir/Madam

Basic Assessment for Legae La Tlhago (PTY) Ltd's proposed expansion of a Pig Production Enterprise on Plot 684 Winterveldt Agriculture Holdings in Winterveldt, Pretoria

1. The above-mentioned application was discussed by the PHRA-G Heritage Impact Assessment (HIA) Committee on Friday, 03 June 2016.

2. After reviewing your report, the following recommendations were made:

a) A Heritage Impact Assessment (HIA) should be conducted during the EIA process, which must amongst other things:

- clearly identify and map the heritage resources on the earmarked property/area.
- give the historical background of the area.
- show how the proposed work might have an impact on heritage resources
- outline mitigation measures
- give a report on the Public Participation process

b) Please note that the requested information will assist the Committee in making an informed decision.

Kind Regards

Tebogo Molokomme

For the Heritage Impact Assessment (HIA) Committee
Provincial Heritage Resources Authority – Gauteng (PHRA-G)

Page 1 of 1

Heritage Impact Assessment Exemption Letter from ASHA Consulting

ASHA Consulting (Pty) Ltd
6A Scarborough Road
Muizenberg
7945

21 July 2016

The Case Officer
Provincial Heritage Resources Authority Gauteng (PHRAG)

Dear Case Officer

EXPANSION OF PIGGERY ON PLOT 684 WINTERVELDT AGRICULTURAL HOLDINGS, GAUTENG: LETTER OF EXEMPTION FROM FURTHER HERITAGE STUDIES

SAHRIS Case ID: 9784

The purpose of this letter is to briefly describe the proposed development and the kind of heritage resources that might be expected in the area and then to motivate that no further heritage studies should be required for the project. It is noted that a consideration of heritage resources was requested by PHRAG, but that the South African Heritage Resources Agency (SAHRA) requested no further studies for the archaeological and palaeontological aspects for which they hold competency. Nevertheless, for the sake of completeness, all heritage resources are briefly reviewed here.

Project proposal

Legae La Tlhago (Pty) Ltd is a small-scale pig and vegetable farming enterprise located on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria (Figures 1 & 2). It is proposed to expand the Pig Farming division of the enterprise by developing a 1.05 ha pig facility, with a throughput of 1049 pigs, as well as a 200.96 m2 slurry dam. Legae La Tlhago's proposed piggery expansion will create much-needed local employment opportunities.

The study area

The area lies on a flat plain and the site is 100% transformed by ploughing, although in recent years some vegetation has re-established itself. Part of the broader property appears to remain unploughed in the southwest, but this area will not be affected in any way by the proposal.

Expected heritage resources

Built environment

There are no built environment resources on the site. The current piggery was constructed after November 2013 with the site being completely empty prior to that (Figures 3 & 4). Google Earth historical imagery shows

ASHA Consulting (Pty) Ltd
Reg. no.: 2013/220482/07 | Directors: Jayson Orton & Carol Orton
6A Scarborough Road, Muizenberg, 7945 | T: 021 788 8425 | C: 083 272 3225
Jayson@asha-consulting.co.za | Carol@asha-consulting.co.za | www.asha-consulting.co.za

that the buildings in the northen corner of the property were intact on 10th August 2006 but had had their roofs removed by 11th August 2010.

Archaeology and graves

This part of South Africa tends to be dominated by Iron Age archaeology, although such material is generally far less common in areas where building stone was not available. Because this site is on a flat sandy plain there was no opportunity to build stone-walled structures and as such important Iron Age sites will not be present in the wider area. That the entire development site has been ploughed for many years also precludes the possibility of intact artefact scatters being present. Only one site is known to be present nearby and that lies within the Tswaing Nature Reserve some 11.5 km east of the site alongside a small crater lake.

Van der Walt (2012) examined a large area for a housing development 14 km east of the present site. That area is part of the same sandy plain and no archaeological material of any kind was found. Van Schalkwyk (2013) looked at substation locations and power line servitude passing through the Winterveldt agricultural holdings area and did not find any archaeological heritage resources. He did report on some graveyards but these were located well south of the present site.

Palaeontology

Although the site lies within an area of high palaeontological sensitivity, it should be noted that the sensitivity relates largely to the underlying geology. In this instance the site is coated in sand/soil which has been cultivated for many years and the construction of the proposed works on this surface will not impact any underlying sensitive geology.

Cultural landscape

The site lies within an agricultural area and already has a small-scale piggery on it. As such, the proposed expansion will not change the character of the surrounding agricultural landscape and, although there will be more built structures on the site, the land use is consistent with that already established for the area.

Conclusion and recommendation

It is expected that no heritage resources would be impacted by the proposed project and it is recommended that the project be allowed to proceed without any further heritage studies being required.

Yours sincerely

Jayson Orton

References

Van der Walt, J. 2012. Archaeological Impact Assessment Report for the proposed Soutpan Low Cost Housing Development close to Pretoria, Gauteng. Unpublished report prepared for MDP Consulting. Modimolle: Heritage Contracts and Archaeological Consulting.

Van Schalkwyk, J. 2014. Basic heritage assessment report for the proposed construction of the 132 kV Dipompong and Tswaing Substations and overhead power lines. Unpublished report prepared for Envirolution Consulting. Monument Park: J van Schalkwyk.

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Jayson@asha-consulting.co.za | Carol@asha-consulting.co.za | www.asha-consulting.co.za

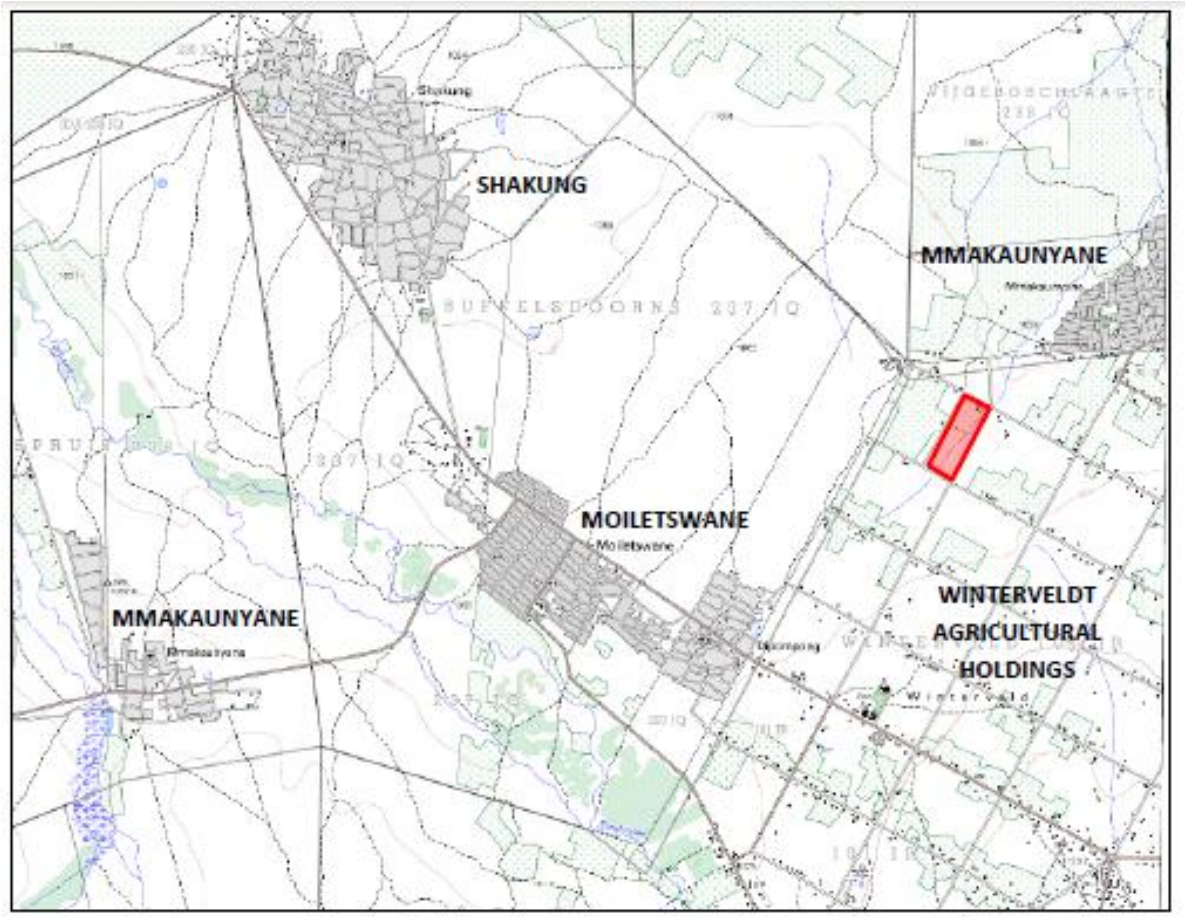

Figure 1: Map showing the location of the site (red polygon). Mapsheet 2527BD (Mapping information supplied by Chief Directorate: National Geo-Spatial Information. Website: wwwi.ngi.gov.za).

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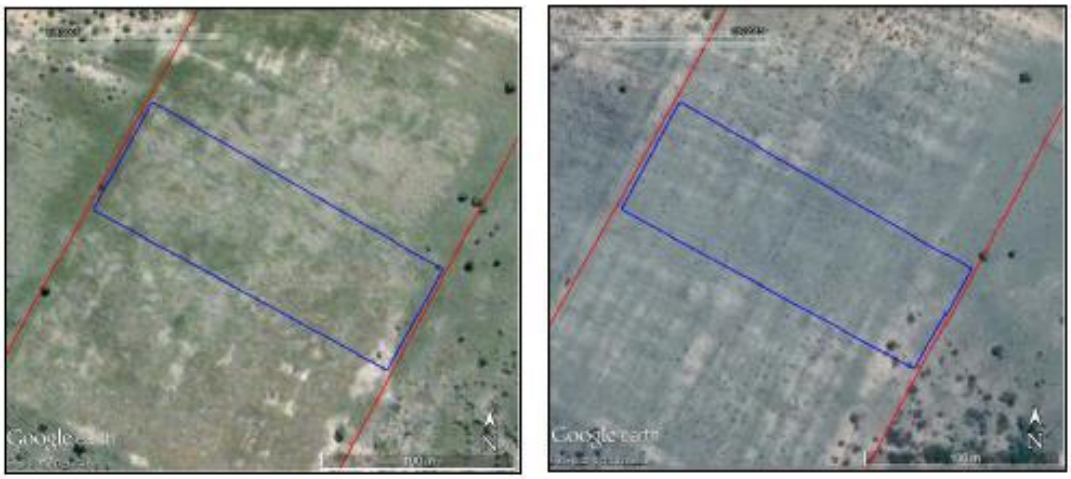
***Figure 2**: Aerial view of the study area showing Plot 84 (red polygon) and the site proposed for the piggery expansion (blue polygon).*



***Figures 3 & 4**: Aerial views of the site dated 9th May 2005 (left) and 5th November 2013 (right) showing that the current small- scale piggery on the property was not yet constructed.*

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***Figure 5**: Extract from the SAHRIS Palaeomap indicating the study area (red polygon) to fall within an area of high palaeontological sensitivity (red shading).*

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Final Basic Assessment Report – Proposed Expansion of a Pig Production Enterprise for Legae La Thlago (Pty) Ltd
Plot 684 Agricultural Holdings, Winterveldt, Pretoria

APPENDIX G: SPECIALIST REPORTS

ECOLOGICAL OPINION/SCAN & WETLAND DELINEATION

FOR THE PROPOSED PIGGERY EXPANSION ON PLOT 684 WINTERVELDT AGRICULTURAL HOLDINGS IN WINTERVELDT, PRETORIA, GAUTENG

Compiled By:

Natural Scientific Services

126 Ballyclare Drive
Morningside
Sandton
2196
Johannesburg

Tel: (011) 787-7400
Fax: (011) 784-7599

Compiled For:

CSIR (Council for Scientific and Industrial Research)
CAS - EMS unit

11 Jan Celliers Street
Stellenbosch
7600

Tel: (021) 888 2432
Fax: (021) 888 2473

NSS Ref No: 2261
Date: June 2016

All pictures taken on site

ECOLOGICAL OPINION/SCAN & WETLAND DELINEATION FOR THE PROPOSED PIGGERY EXPANSION ON PLOT 684, WINTERVELDT AGRICULTRUAL HOLDINGS IN WINTERVELDT, PRETORIA, GAUTENG.

Compiled For:

CSIR Stellenbosch (CAS, EMS)
11 Jan Cilliers Street
Stellenbosch, 7600
Western Cape, South Africa
Tel: (021) 888 2432
Fax: (021) 888 2473

Compiled By:

Natural Scientific Services CC

126 Ballyclare Dr
Morningside ext 40
Sandton, Johannesburg
Tel: (011) 787-7400
Fax: (011) 784-7599

Ref No: 2261
Date: June 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) and wetland delineation for the proposed expansion of an existing piggery on Plot 684 in Winterveldt, Pretoria, Gauteng. Desktop research and findings from the site visit indicated that the proposed expansion area comprises mainly crop and fallow land (*Acacia* Woodland in recovery) and built infrastructure. A seep on the eastern boundary of the site, and a small pan/dam beoynd the southern boundary of the site, are regarded as the most significant local biodiversity features. Apart from being protected under the National Water Act, the seep provides a number of moderate-high rated eco-services, and the pan may support breeding by species such as the Giant Bullfrog.

Without mitigation, the most significant potential impacts of the proposed project on biodiversity include:

- The introduction of alien flora with the influx of vehicles, people, and materials, and their proliferation in the absence of effective control measures, during all phases of the development.
- Direct loss of 0.08 ha of transitional seep wetland habitat, and deterioration of downstream wetland drivers with construction of additional hardened surfaces, increased sedimentation, etc.
- Deterioration of water quality from poor waste management and accidental spills, and impacts of this on downstream aquatic ecology.
- Poor / Inappropriate control of invertebrate pests, and disease transmission, during operation.

To mitigate these impacts, the following key measures are recommended:

- Revise the proposed layout of the development, where necessary, to avoid disturbing the seep wetland and its recommended buffer, and the identified *Acacia* Sandy Bushveld area.
- Limit vehicles, people and materials to the construction site.
- Remove Category species using mechanical methods and minimize soil disturbance as far as possible.
- Remove the current drain and slurry facility from within the wetland buffer to the adjacent terrestrial zone.
- It is essential to ensure that the pig houses and associated drains and slurry facility are designed and lined with impermeable substances (e.g. concrete) in accordance with advice from suitably qualified agricultural experts and international best practice norms. The primary aim should be to avoid contamination of the drainage feature.
- Ensure that the gutter conveying pig effluent is closed i.e. piped to the slurry pond to prevent spillage and contact with wildlife.

- Adhere to best practice pig husbandry and waste disposal norms.
- Incorporate effective storm water management design aspects into the infrastructure plan.
- 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. The run-off substances should be effectively captured and stored, and later disposed of at an appropriate licensed facility for hazardous waste.
- 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.
- Rehabilitate contaminated areas a.s.a.p. in accordance with advice from appropriate contamination and environmental specialists.

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.* 30/06/2016

SACNASP Reg. No. 400116/05 **Date**

(Ecological & Environmental Science)

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LIST OF ACRONYMS

ACRONYM	DESCRIPTION
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CI	Conservation Important
CIS	Conservation Important Species
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
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
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
LoO	Likelihood of Occurrence
MAP	Mean Annual Precipitation
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)

ACRONYM	DESCRIPTION
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
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
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
VU	Vulnerable – a Red Data classification used by the IUCN for describing species in danger of facing extinction
WITS	University of the Witwatersrand
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, 1998 (NEMA, Act 107 of 1998) and the National Water Act, 1998, (NWA, Act 36 of 1998), for the development of a small-scale pig and vegetable farming enterprise (Legae La Tlhago (Pty) Ltd). The proposed project will be approximately 8.8 ha in extent and will be located on Plot 684, Winterveldt Agricultrual Holdings in Winterveldt, Pretoria, Gauteng (**Figure 1-1**). The site is currently being farmed and a small piggery already exists.

The CSIR appointed Natural Scientific Services CC (NSS) to undertake an ecological scan/opinion and a wetland assessment for the proposed project in line with the NEMA and NWA requirements.The CSIR is undertaking the work *pro-bono* as part of the “Special Needs Skills and Development Programme”. NSS have reduced their costs in order to facilitate in the *pro-bono* project. Whilst 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, 2004 (Act 10 of 2004) is to provide for, amongst others the management and conservation of South Africa’s biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; 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.”*

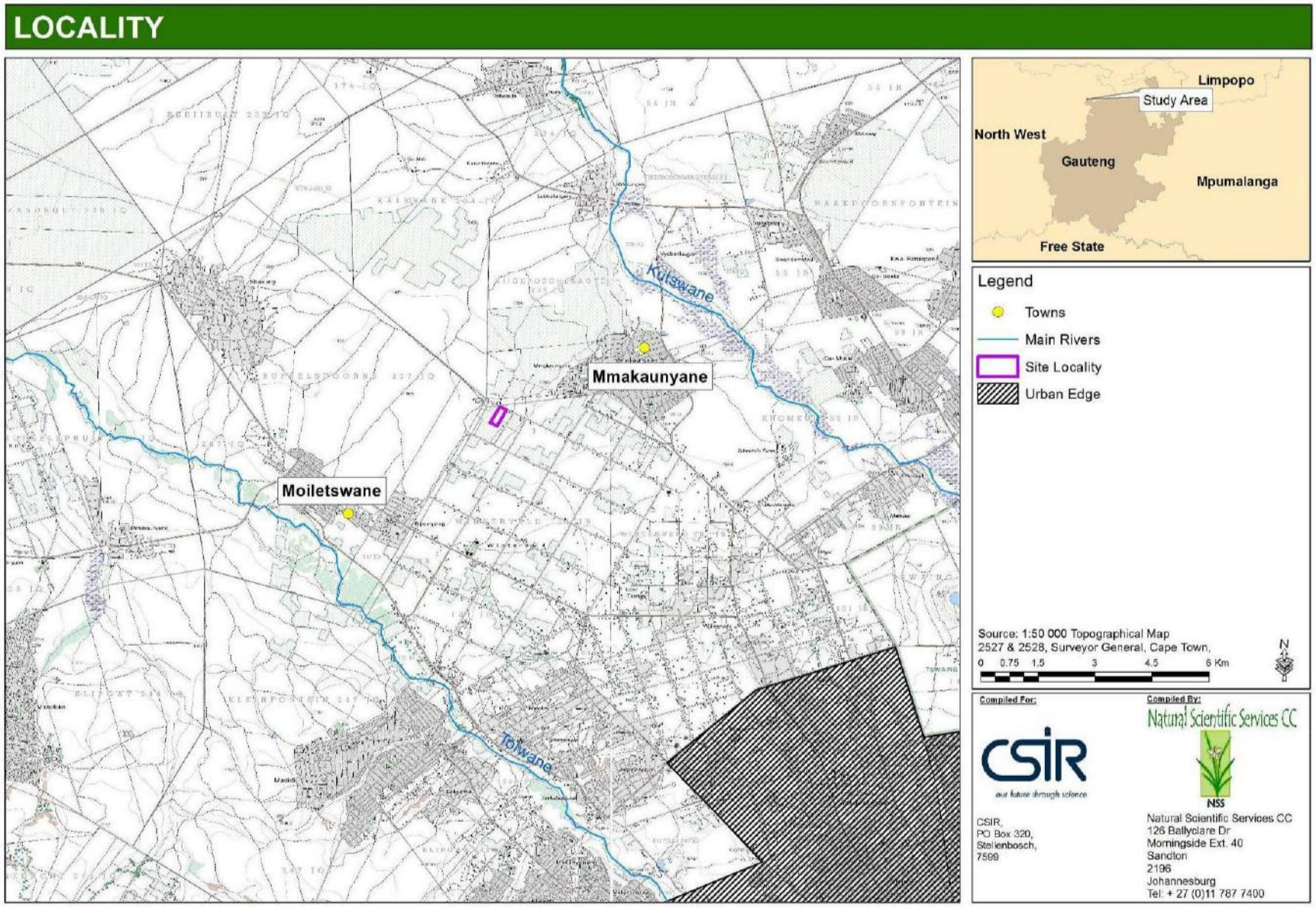


Figure 1-1 Locality Map of the area

2. Terms of Reference

As agreed between the CSIR and NSS, our assessment was performed according to the methodology described in **Section 6, 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 map indicating the wetland/riparian delineation (outer boundary of the temporary zone/riparian fringe and associated buffer).
- The Present Ecological State (PES) of the wetland systems.
- The Ecological Importance and Sensitivity (EIS) of the wetland systems.
- 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 have extensive experience in project management and fieldwork for numerous ecological and biodiversity studies as well as aquatic and wetland assessments. The team have 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:

- The Senior team members are registered Professional Natural Scientists in the ecological, environmental, aquatic and zoological fields.
- The Aquatics Scientist is SASS5 accredited (South African Scoring System version 5) with Department of Water and Sanitation (DWS) to perform aquatic macro-invertebrate monitoring.

- The Wetland Specialists is acknowledged by the DWS as a Competent Wetland Delineator.

The details of the project team are included in **Table 3-1**

Table 3-1 Project team with associated areas of specialisation

ASPECT INVESTIGATED	SPECIALIST	QUALIFICATIONS
Vegetation & Project Management	Susan Abell	M.Sc. Resource Conservation Biology (WITS). *PrSciNat* Registered (400116/05) – Ecology & Environmental Science.
Wetlands	Kathy Taggart	MSc Resource Conservation Biology DWS Acknowledged – wetland/riparian delineator *PrSciNat* Registered (400225/08) – Ecology & Environmental Science
Fauna	Tyron Clark	B.Sc. Honours – Zoology (WITS).
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.

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

International Policies and Agreements

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

Regional Agreements

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

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):
    - Threatened, Protected, Alien and Invasive Species Regulations (2007).
    - Alien and Invasive Species Regulations (Government Gazette [GG] 37885, 1 August 2014).
    - National list of Ecosystems Threatened and in need of Protection under Section 52(1) (a) of NEM: BA (GG 34809, Government Notice [GN] 1002, 9 December 2011).
- National Environmental Management: Air Quality Act (Act 39 of 2004).

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 DWS).
- National Freshwater Ecosystem Priority Areas project (Driver *et al*. 2011).
- South African Water Quality Guidelines, First Edition, 1996.
- Mining and Biodiversity Guideline (DEA *et al.* 2013).
- National Water Resource Strategy (DWAF, 2013).
- Review of biodiversity management in the mining industry in South Africa by Kuntonen-van't Riet (2007).
- SANBI Grasslands Programme.
- Threatened Grassland Species Programme of the Endangered Wildlife Trust (EWT).
- Mining & Biodiversity Guideline (MBG) (DEA *et al.* 2013).
- Wetland offsets: a best-practice guideline for South Africa (MacFarlane *et al.* 2014).

- A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas (DWAF, 2005).
- Department of Water Affairs and Forestry (DWAF), 2005. Environmental Best Practice Guidelines: Planning. Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria

Provincial Legislation, Policies & Guidelines

- Gauteng Nature Conservation Ordinance (Ordinance 12 of 1983), amended by the Gauteng General Law Amendment Act (Act 4 of 2005).
- Gauteng Nature Conservation Bill (2014) – to repeal the Gauteng Nature Conservation Ordinance (Ordinance 12 of 1983).
- Gauteng Conservation Plan (C-Plan). Version 3.3 (GDARD 2014).
- Gauteng Protected Areas Expansion Strategy (GDARD 2011).
- GDARD Requirements for Biodiversity Assessments. Version 3 (GDARD 2014).

5. Study Site Description

5.1. Locality & Land use

Legae La Tlhago (Pty) Ltd a small-scale pig and vegetable farming enterprise (**Figure 1-1**) situated approximately 3 km west of Mmakaunyana. It is proposing to expand to a 1.05 ha pig facility, with a throughput of 1049 pigs, as well as a 200.96 m^2 slurry dam (**Figure 5-1**). The Study Site, which is approximately 8.76 hectares (farm boundary highlighted in red in **Figure 5-2**) contains, natural, semi-natural and transformed habitats. The proposed Expansion Area, however, is mostly transformed with an semi-natural pocket of woodland to the west (approximately 700 m^2 in extent). Current land uses on site include:

- A Piggery of approximately 0.35 ha in extent;
- A slurry dam (100m2 in extent);
- Crop fields (current and past);
- Vegetable Patch;
- Housing structures;
- Natural woodland pockets of vegetation;

In terms of the historical land uses, not much has changed within the Study Site. Evidence of crop farming can be seen since the first images were released on Google Earth in 2005. The piggery was established between 2014-2015 (**Figure 5-2**)..

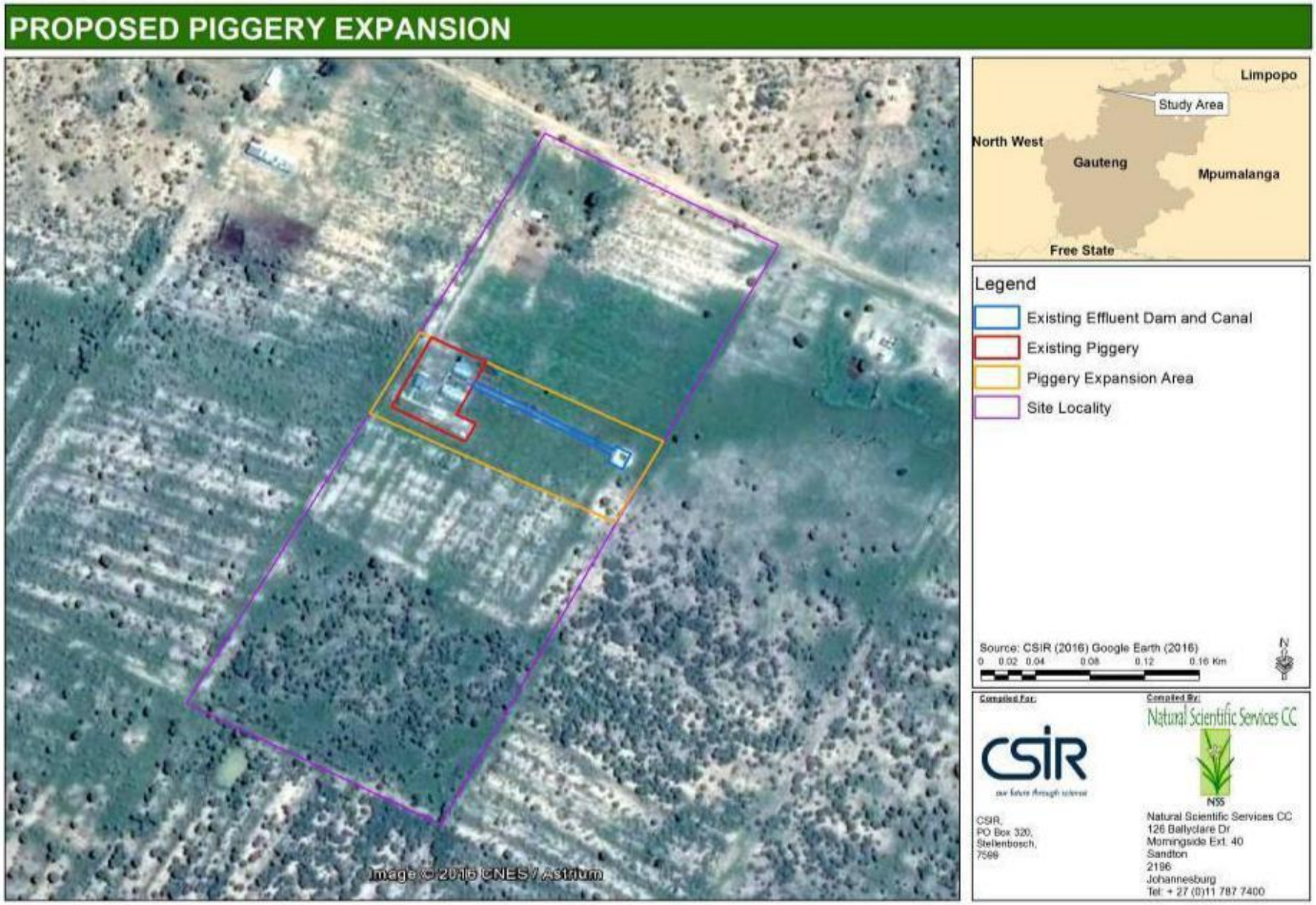


Figure 5-1 Study Site and the proposed Piggery Expansion Area

Imagery from 2005

Imagery from 2016

Figure 5-2 Historical Changes on Site (2005 – 2016)

Fallow Crop Fields (Turf soils)

Piggery

Effluent canal

Slurry Dam

Figure 5-3 Current land uses and structures (photo's taken on site)

5.2. Climate

The study site falls within a strongly seasonal summer rainfall region with very dry winters (**Figure 5-4**). The area receives a Mean Annual Precipitation (MAP) of about 500 to 650 mm. Frosts occur fairly infrequent in winter. The hottest part of the year occurs between October and March with an average temperature of ~28°C, while June to August is the coldest period with an average temperature of ~6°C. In the last year (May 2015 – May 2016), which has been considered a drought year, the wettest month was March 2016 (199mm) (www.weathersa.co.za; www.accuweather.co.za). The rainfall in the last summer season was very late with the area only having ~112 mm from October 2015 – December 2015, yet 451 mm from January 2016 – May 2016. The NSS field investigations were undertaken in late April, after the heavy rainfall of March and yet also, after the temperatures had begun to decrease from the warmer summer months.

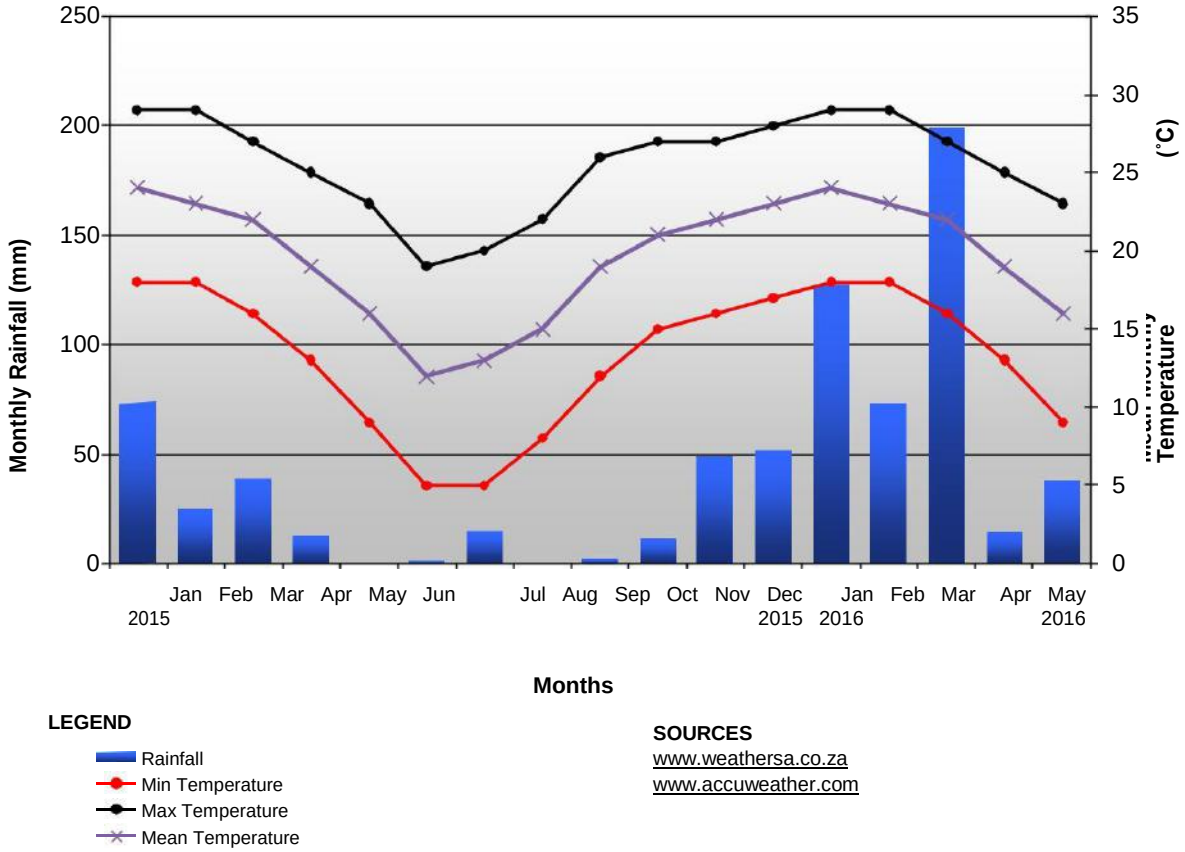


Figure 5-4 Monthly Rainfall and Temperature Patterns for Johannesburg from January 2015 to April 2016

5.3. Geology & Soils

The geology of the study area and greater surrounds predominantly comprises of siltstone, sandstone and shale of the Irrigasie Formation; fine-grained sandstone of the Clarens Formation;

sandstone, grit and shale of the Ecca Group and Karoo Sequence (AGIS, 2014). The study site is situated in land type[1] Ae20 (**Figure 5-6**), supporting mostly volcano-sedimentary Karoo Supergroup. Most abundant in the area are the mafic volcanic (tholeitic and olivie basalts and nephelinites) of the Letaba Formation, then the mudstones of the Irrigasie Formation and the shale, with sandstone units, of the Ecca Group. Soils are red-yellow apendal, freely drained with high base status and sel-mulching , black vertic clays. The vertic soils, with a fluctuating water table, experience prolonged periods of swelling and shrinking during wet and dry periods, considerable soil cracking when dry, a loose soil surface, high calcium carbonate content and gilgai micro-relief (Mucina & Rutherford, 2006; AGIS, 2014). Across a landscape, usually five terrain units can be identified. The catena within land type Ae20 incorporates four of the five terrain units 1, 3, 4 and 5, as shown in **Figure 5-5**. 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 Ae20 (AGIS, 2014).

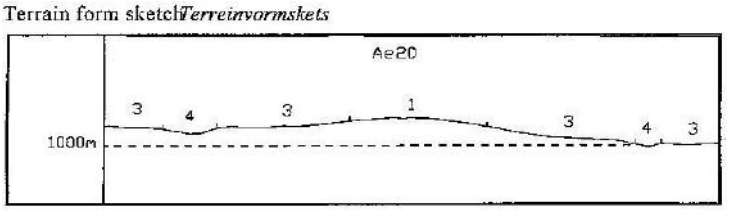


Figure 5-5 Terrain units occurring within land type Ae20 (AGIS, 2014)

Table 5-1 Soil forms, their wetland potential, coverage, and erodibility classes within the terrain units of land type Ae20

SOILSERIES OR LAND CLASSES	Depth (mm)	% COVER PER TERRAIN UNIT			
Terrain unit		1	3	4	5
Slope		0-1	1-2	0-1	0-1
Shorrocks Hu36	500-1200+	50	50	25	
Zwartfontein Hu34	900-1200+	20	15		
Blinkklip Cv36, Makuya Cv34	900-1200+	10	10		
Mangano Hu33	900-1200+	10	10		
Lindley Va41, Sterkspruit Ss26	300-450		5	50	
Loskop Ms12, Kalkbank Ms22	200-400	10	5		
Glendale Sd21	700-1200+		5		
Gelykvlakte Ar20	450-900			10	100
Jozini Oa36	700-1200+			10	
Weenen B040, Bushman	450-1200+			5	

Source: AGIS (2014)

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

5.4. Vegetation

The study area is situated in the Savanna Biome, and more specifically the **Endangered (EN)** *SVcb 15 Springbokvlakte Thornveld* (**Figure 5-6**). This vegetation occurs in flat to slightly undulating plains with open to dense, low thorn savanna that is dominated by indigenous *Acacia* species or shrubby grassland with a very low shrub layer (Mucina & Rutherford (2006).

At least 49% of the vegetation type is transformed trough cultivation practices (45%) and urban development (4%) including dense rural populations in parts of the southern and eastern side of the unit. Commonly occurring alien plants include *Cereus jamacaru* (Queen-of-the night), *Eucalyptus* species (Gum trees), *Lantana camara* (tickberry), *Melia azedarach* (white cedar), *Opuntia ficus-indica* (Prickly pear) and *Sesbania punicea* (Spanish gold).

Table 5-2 Dominant floral species – Springbokvlakte Thornveld

Vegetation Type	Springbokvlakte Thornveld
Small Trees:	*Acacia karroo* (Sweet thorn), *A. leuderitzii var retinens* (Red Wag-'n-bietjie), *A. mellifera subsp detinenes* (Black thorn), *A. nilotica* (Scented -pod *Acacia*), *Ziziphus mucronata* (Buffalo thorn), *Acacia tortilis subsp heteracantha* (Umbrella thorn acacia), *Boscia foetida subsp. rehmanniana* (Foetid Shepherd Tree)
Tall Shrubs:	*Euclea undulata* (Common Guarri), *Searsia engleri* (Velvet karee), *Dichrostachys cinerea* (Sicklebush), *Diospyros lycioides subsp . lycioides* (bluebush) , *Grewia flava* (Cross -berry), *Tarchonanthuscamphoratus* (Camphor bush)
Low Shrubs:	*Acacia tenuispina* (Hook thorn), *Ptycholobium plicatum*
Succulent Shrub	*Kleinia longiflora* (Sjambok bush)
Herbaceous Climbers:	*Momordica balsamina* (African cucumber), *Rhynchosia minima* (snout-bean)
Graminoids:	*Aristida bipartita*, *Dichanthium annalatum var papillosum* (Bluestem), *Ischaemum afrum*, *Setaria incrassate* (vlei bristle grass), *Aristida canenscens*, *Brachiaria eruciformis* (Creeping panic grass)
Herbs:	*Aspilia mossambicensis* (wild sunflower), *Indigastrum parviflorum, Nidorella hottentotica* (Common nidorella), *Orthosiphon suffrutenscens, Senecia apiifolius* (old -man-in-the-Spring)
Vegetation Type	**Biogeographically Important Taxa (endemic to the Springbokvlakte Thornveld)**
Graminoid:	*Mosdenia leptostachys*

Source: Mucina & Rutherford (2006)

5.5. Hydrology

The study area is located within the Bushveld Basin Eco-region (8.05), Crocodile (West) & Marico Water Management Area (WMA) 3 and Quaternary catchment A23J (**Figure 5-7**). The study area is approximately 7.2 km West of the Kutswane River. The Kutswane River is a perennial Lower

Foothill and **Critically Endangered** (CR) and not protected (Driver & Nel, 2012; Driver *et al*. 2011). The Ecostatus and current impacts on the Kutswane River is summurised in **Table 5-3**.

The desktop PES of the Kutswane River is largely modified (a D category) and large losses of natural habitats, biota and basic ecosystem functions have occurred. The Ecological Importance (EI) and Ecological Sensitivity (ES) of the Kutswane River are high and moderate, respectively. The total number of species that occur in the secondary catchment is a 100. Fifty one species, three wetland and nine riparian habitat types, 15 different vegetation cover types, two protected and two endemic species occur in this sub-quaternary catchment. The main habitats of this river are surface flows, alluvial bottom, riparian trees and seeps. The main impacts identified are dams and eutrophication Sensitivity will be higher in the Tswaing Nature Reserve area, but for the bulk of the river which is alluvial (and no water), it is not sensitive. There is almost no habitat diversity and it is very disturbed (DWS, 2014).

Table 5-3 Ecostatus and impacts of the Kutswane River

Quaternary Catchment	Water Resource	Present Ecological State (PES)	Ecological Importance (EI)	Ecological Sensitivity (ES)	Current Impacts
A23J	Kutswane River	**D Largely modified**	**HIGH**	**MODERATE**	SERIOUS: Grazing (land-use), bed & channel disturbance LARGE: Agricultural fields, low water crossings, erosion, overgrazing/trampling, vegetation removal, run-off/effluent from urban areas & urbanization MODERATE: Water abstraction, small (farm) dams, alien vegetation, roads & sedimentation SMALL: Algal growth, alien aquatic macrophytes, inundation, increased flows, natural areas/nature reserves & recreation

Source: DWS (2014)

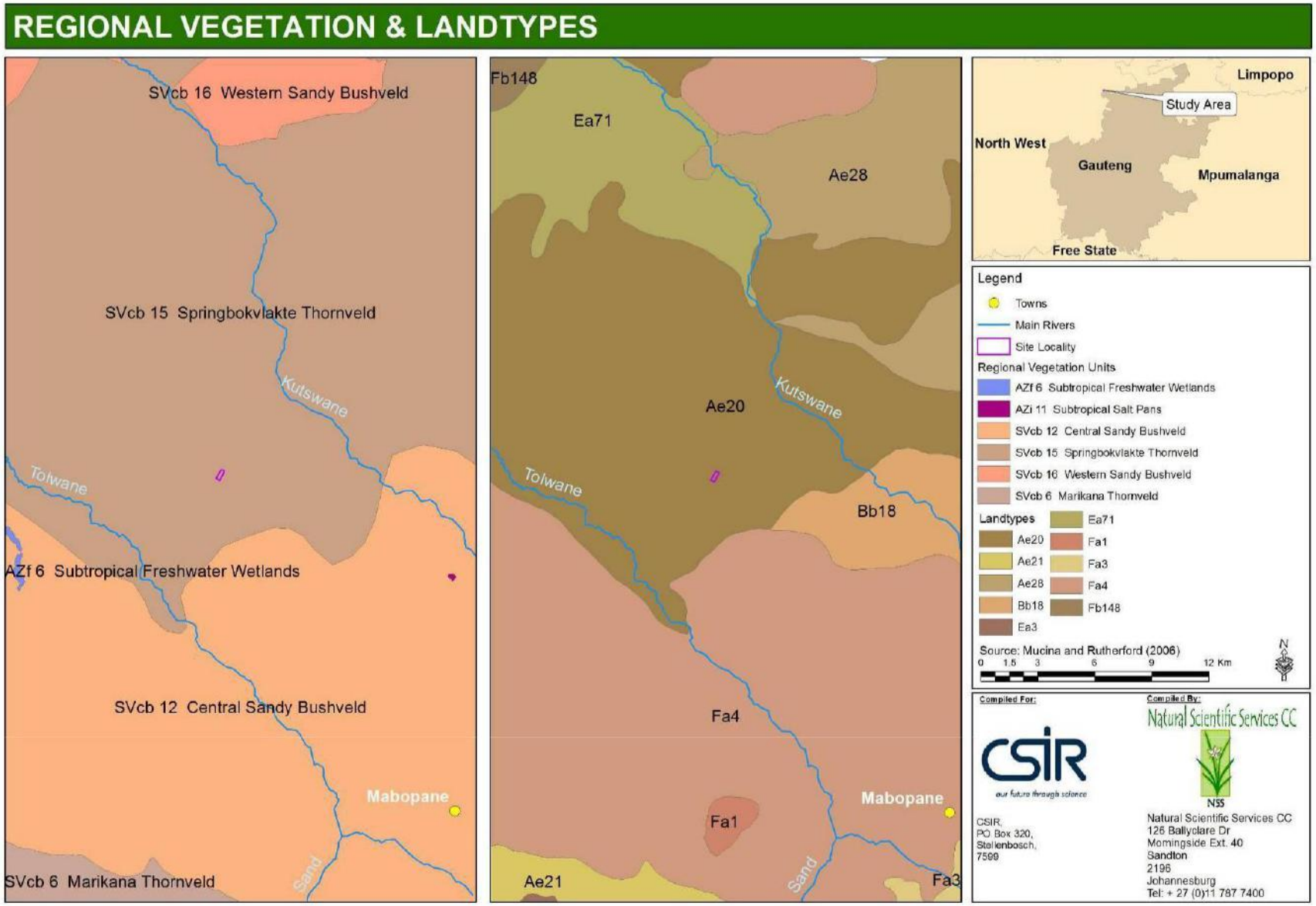


Figure 5-6 Regional Vegetation Units and Land types

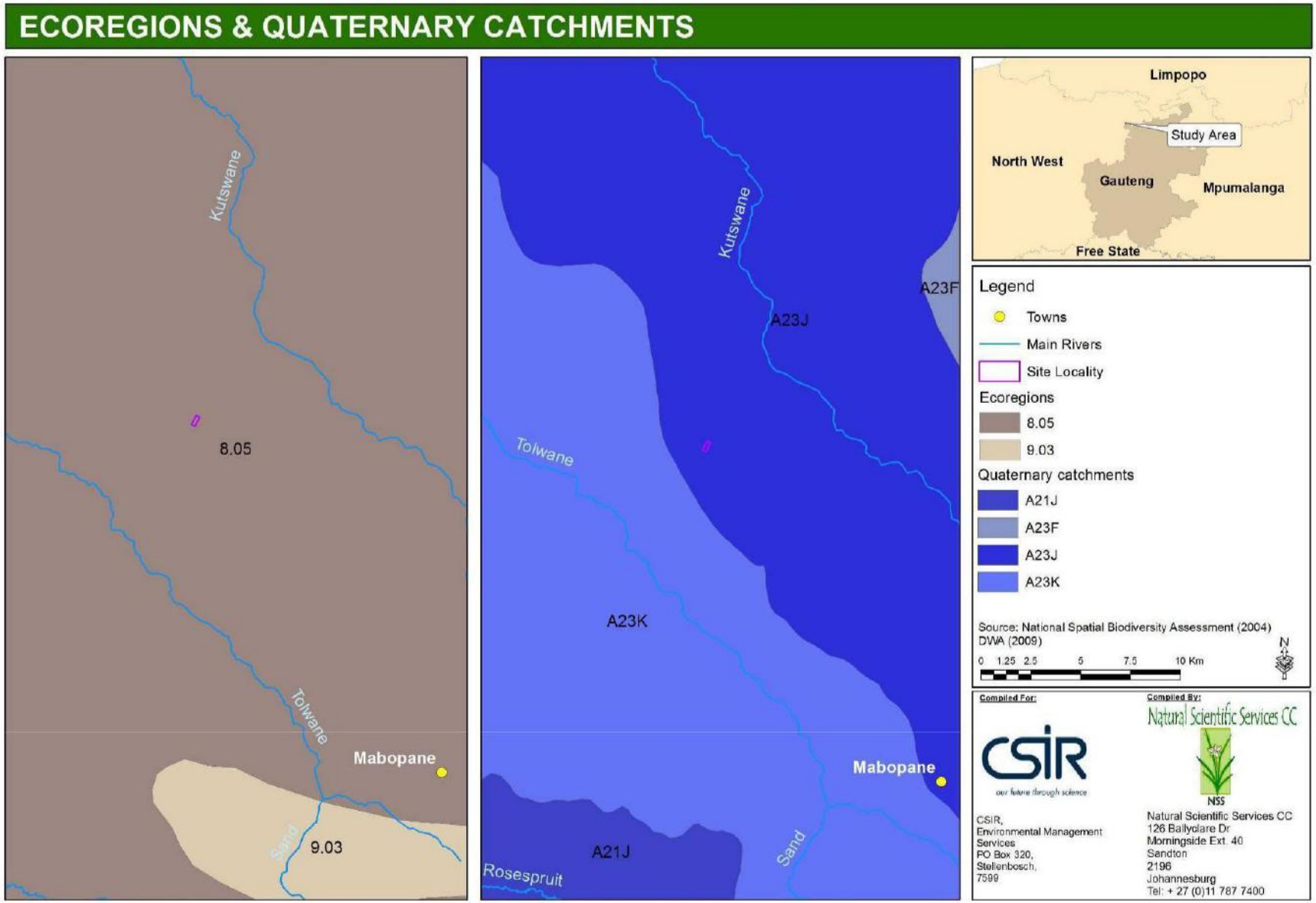


Figure 5-7 Eco-region and Quaternary Catchment

6. Methodology

The ecological scan involved desktop research and fieldwork, which was performed during a site visit on 25 April 2016.

6.1. Vegetation & Floral Communities

Over 60% of the Study Site has been transformed through agricultural practices and therefore, due to the small extent, extensive transformations and the homogeneous nature of the recovery areas, 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 TWINSPAN. 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's[2] Plants of South Africa (POSA) 2527BD QDS
  - Mucina & Rutherford's (2006) vegetation map of southern Africa.
  - The current Gauteng 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, June 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

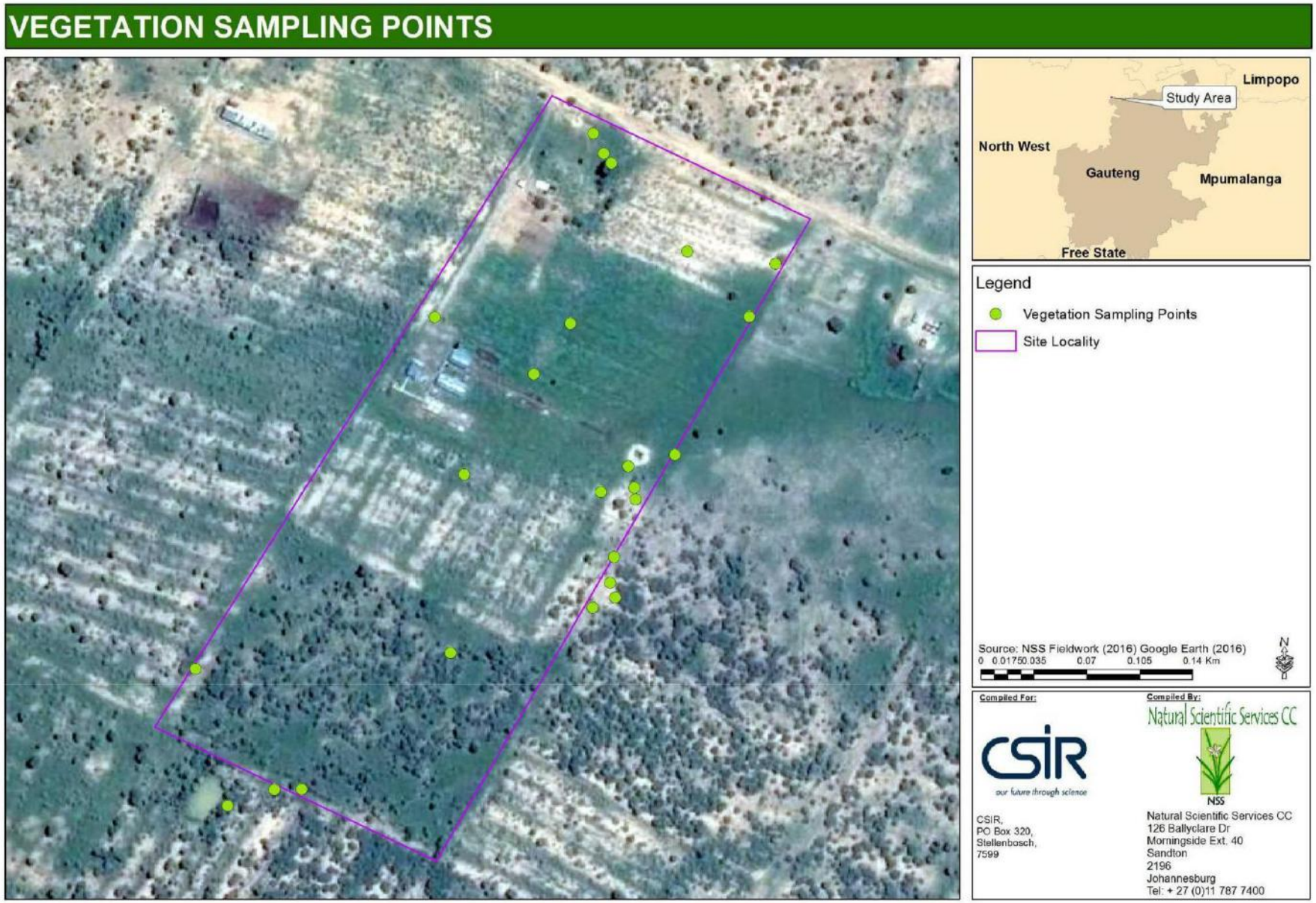


Figure 6-1 **Main vegetation sampling points**

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 close to the end of the growing season). At the end of summer many species have died back and retracted making it difficult to confirm identification. The 2015/2016 season also experienced below average rainfall in the beginning of the season.
- 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 using the published species distribution maps in Friedmann & Daly (2004), Stuart & Stuart (2007) and Monadjem *et al.* (2010) as well as online species distribution data from MammalMap (2016).
- Birds, using the latest online list of bird species from the first and second Southern African Bird Atlas Projects (SABAP 1 & 2) for pentad 2520_2755. Bird species were grouped according to a modified version of Newman's (2002) 12 bird categories.
- Reptiles, using the published species distribution maps in Bates *et al.* (2014) and online species distribution data from ReptileMap (2016).
- Frogs, using the published species distribution maps in Minter *et al*. (2004) and online species distribution data from FrogMap (2016).
- Butterflies, using the published species distribution maps in Mecenero *et al.* (2013) and online species distribution data from LepiMap (2016).
- Scorpions, using the published species distribution maps in Leeming (2003). Currently, ScorpionMap cannot be used reliably to generate geographic species lists.
- Odonta, using distribution maps and habitat description provided in Samways (2008)
- Baboon spiders using Dippenaar-Schoeman (2002).

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

1 Present: the species, or signs of its presence, was observed on Site or in the immediate surrounding area by NSS.

2 High: the species is highly likely to occur, based on available distribution data, and observed habitats.

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 marginal distribution or a lack of suitable habitat.

6.2.2 Fieldwork

Faunal observations were made while driving, walking, and inspecting different habitats on site and in the area. Taxa were identified based on observations specimens, spoor, droppings, burrows and other evidence. Rocks and logs were turned in search of reptiles, scorpions, frogs and invertebrates. A sweep net was used to catch butterflies.

6.2.3 Conservation Status of Species

In the appended faunal lists, the Global and National status of species is provided, in addition to the status of species as indicated on the Threatened or Protected Species list (ToPS, 2015) under the National Environmental Management: Biodiversity Act (NEM:BA 2004). National conservation status was assigned as follows:

- Mammals by Friedmann & Daly (2004).
- Birds by Taylor *et al*. (2015).
- Reptiles by Bates *et al.* (2014).
- Frogs by Minter *et al.* (2004).
- Butterflies by Mecenero *et al*. (2013).
- Dragonflies and damselflies (i.e. odonata) by Samways (2006).

An atlas and Red Data book for South African scorpion or baboon spider species has not yet been published. Note that due to spatio-temporal variation in human disturbances, the conservation status of some species differs between the IUCN, the relevant national Red Data assessment publication, and the ToPS list. **Unless otherwise stated, the most threatened status of a species is provided (in abbreviated form) in text, whether this is at a global or national scale.** The abbreviations are as follows:

- EN = Endangered
- VU = Vulnerable
- NT = Near-threatened
- PS = Protected Species
- DD = Data Deficient
- LC = Least Concern

6.2.4 Limitations

- Our visit was limited to a single morning; therefore, nowhere near all of the potentially occurring (especially nocturnal) species were detected.
- Many species, which are uncommon, small, migratory, secretive or otherwise difficult to detect may not have been detected even though they were potentially present.

- Due to budget implications and the scale of the project several methods that would have drastically improved sampling success were beyond the scope of this study, these included the use of extensive trapping (pitfall, array and Sherman traps), acoustic (bats and amphibians) or motion camera surveys for extended periods of time.

6.3. Wetlands

6.3.1 Wetland Desktop Assessment

Prior to any field investigations being undertaken, the area was surveyed at a desktop level using 1:50 000 topographical maps, Google Earth™ Imagery, contour data, provincial and national databases, as reference material to determine the layout of potential wetlands on the Study Site.

The wetland field investigations were undertaken in April 2016.

6.3.2 Wetland Classification

All wetlands were classified using the recently-published "Classification system for Wetlands and other Aquatic Ecosystems in South Africa" by Ollis *et al*. (2013), hereafter referred to as "the Classification System." Ecosystems included by the Classification System encompass all those that are listed under the Ramsar Convention as "wetlands[3]," and include all freshwater (non-marine) systems. The Classification System recognizes three broad inland systems: rivers, wetlands and open water bodies. Like Kotze *et al's* (2008) classification of wetlands based on hydro-geomorphic (HGM) units, the Ollis *et al*. (2013) Classification System asserts that the functioning of an inland aquatic ecosystem is determined fundamentally by hydrology and geomorphology. The Classification System has a six-tiered structure where under the determination of a system's HGM unit (Level 4):

Level 1 – Type of system (marine, estuarine or inland).
Level 2 – Regional setting (Level 1 Ecoregions; NFEPA WetVeg units; etc.).
Level 3 – Landscape unit (valley floor, slope, plain, and bench).
Level 4 – Hydro-geomorphic (HGM)
unit. Level 5 – Hydrological regime.
Level 6 – Descriptors (natural vs. artificial; salinity; pH; etc.).

[3] Under the Convention on Wetlands (Ramsar, Iran, 1971) "wetlands" are defined by Articles 1.1 and 2.1 as: Article 1.1: "*For the purpose of this Convention wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres*." Article 2.1 provides that wetlands: "*may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands*".

6.3.3 Wetland Extent

The wetland delineation methods used in the field were the same as those outlined in the DWS field procedure for identification and delineation of wetlands and riparian areas (DWAF, 2005). The following three indicators described by DWAF (2005) were used:

- Terrain Unit Indicator: The topography of the area was used to determine where in the landscape wetlands were likely to occur. McVicar *et al*. (1977) defines five terrain units (**Figure 6-2**). Most wetlands will be found in valley bottoms (unit 5), but can occur on crests, mid slopes and foot slopes (units 1, 3 and 4).

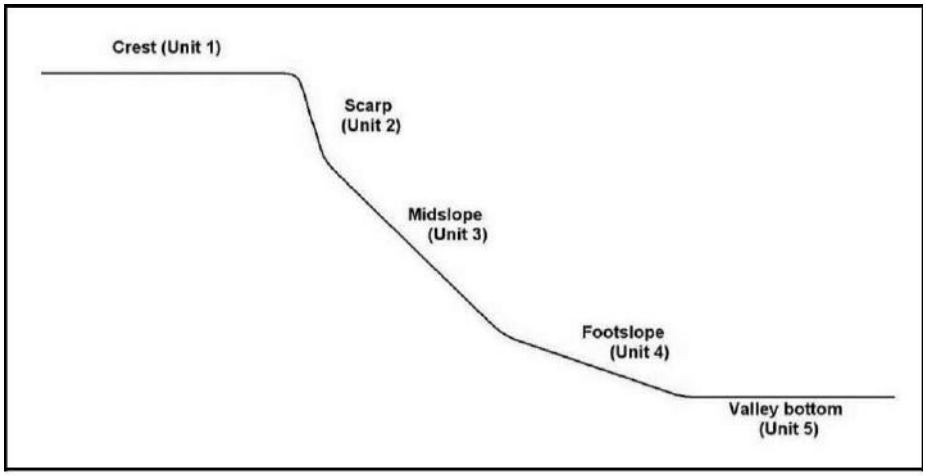


Figure 6-2 Simple depiction of terrain units (adapted from DWAF, 2005)

- Soil Wetness Indicator: The soil wetness and duration of wetness are indicated by the colour of the soil. A grey soil matrix such as a G-horizon is an indication of wetness for prolonged periods of time and mottles indicate a fluctuating water table. In terms of the DWS guidelines (DWAF, 2005), signs of soil wetness must be found within the top 50 cm of the soil surface to classify as a wetland. The permanent zone of a wetland is therefore characterised by grey soil, the seasonal zone has a high frequency of low chroma mottles and the temporary zone has less, high chroma, mottles. These mottles are normally most prominent just below the A-horizon. Mottles may occur in non-wetland soils that have a high chroma matrix, and the colour of the matrix must always be considered in conjunction with the presence of mottles.

- Vegetation Indicator: Vegetation is a key component of the wetland definition in the National Water Act, 1998 (Act No 36 of 1998), and vegetation can be used as an indicator of wetland conditions. The presence / absence of hydrophytes provide a useful additional criterion in determining the boundaries of wetlands. Due to the extensive agriculture o site, the use of this indicator was limited.

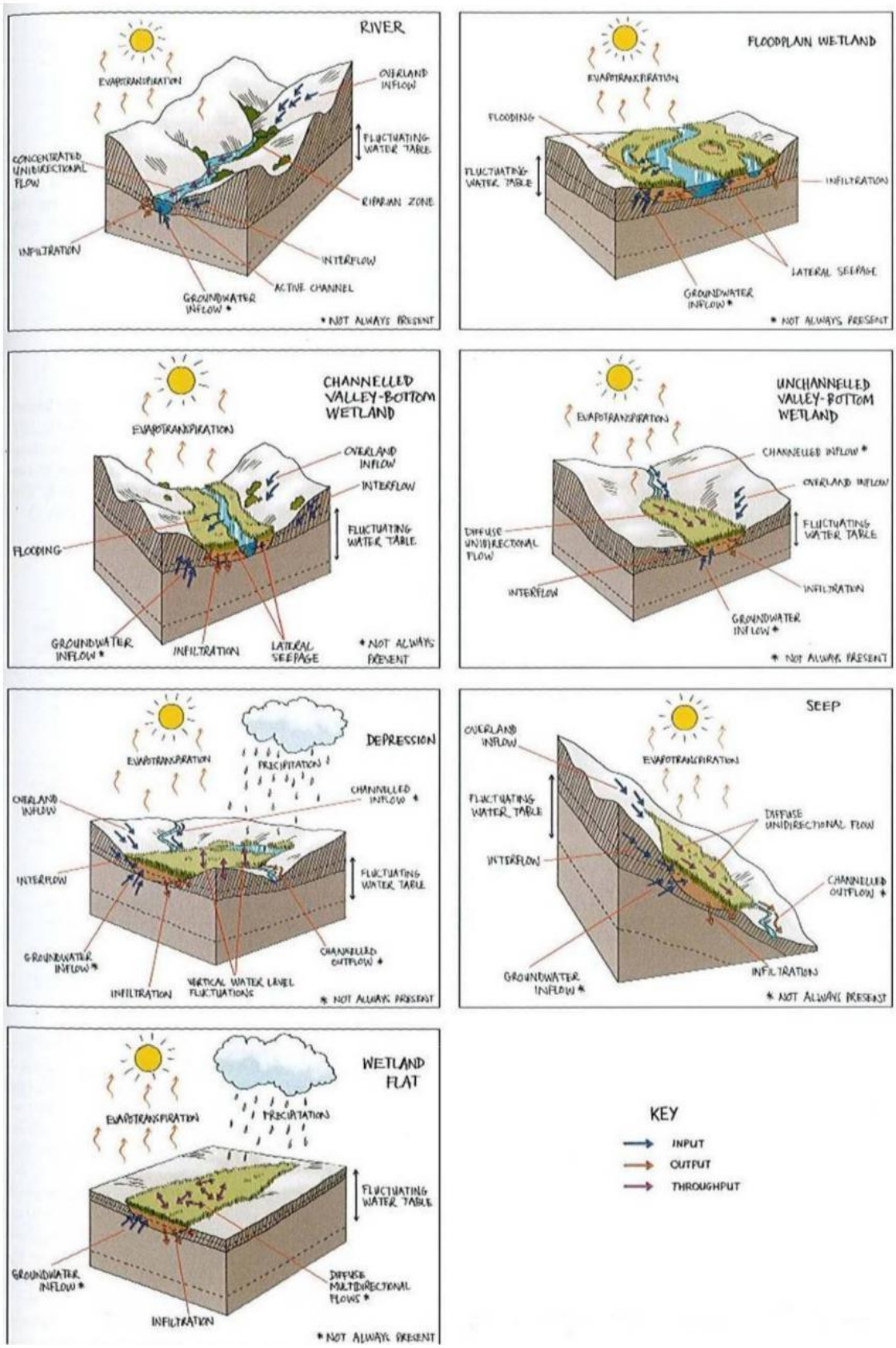


Figure 6-3 Primary wetland HGM types, highlighting dominant water inputs throughputs & outputs (Ollis *et al.* 2013)

6.3.4 Wetland Present Ecological State (PES)

The PES of the wetland systems identified within the site was assessed using the Level 1 WET-HEALTH tool of Macfarlane *et al.* (2008). The WET-HEALTH tool is designed to assess the health or integrity of a wetland. To assess wetland health, the tool uses indicators based on the main wetland drivers: geomorphology, hydrology and vegetation.

Macfarlane *et al.* (2008) explain that the application and methodology of WET-HEALTH uses:

- An impact-based approach, for those activities that do not produce clearly visible responses in wetland structure and function. The impact of irrigation or afforestation in the catchment, for example, produces invisible impacts on water inputs. This is the main approach used in the hydrological assessment.
- An indicator-based approach, for activities that produce clearly visible responses in wetland structure and function, e.g. erosion or alien plants. This approach is mainly used in the assessment of geomorphology and vegetation health.

With WET-HEALTH a wetland is first classified into HGM units (Level 4 – Ollis *et al.* 2013), and each HGM unit is separately assessed in terms of the extent, intensity and magnitude of impacts on the hydrology, geomorphology and vegetation of the unit, which is translated into a health score as follows:

- The *extent* of impact is measured as the proportion (percentage) of a wetland and/or its catchment that is affected by an activity.
- The *intensity* of impact is estimated by evaluating the degree of alteration that results from a given activity.
- The *magnitude* of impact for individual activities is the product of extent and intensity.
- The magnitudes of all activities in each HGM unit are then combined in a structured and transparent way to calculate the overall impact of all activities that affect a unit's hydrology, geomorphology and vegetation, and wetland PES is expressed on a scale of A-F (**Table 6-1**).

In addition, the threat and/or vulnerability of a wetland must be assessed to determine its likely "trajectory of change" (**Table 6-2**). Overall wetland health is then jointly represented by the wetland's PES and trajectory of change. This approach not only provides an indication of hydrological, geomorphological and vegetation health, but also highlights the key causes of wetland degradation.

6.3.5 Wetland Functionality

The WET-EcoServices tool of Kotze *et al.* (2008) provides a means for rapidly assessing ecosystem services supplied by wetlands. More specifically, the tool was designed to help

assess the goods and services that individual palustrine wetlands (i.e. marshes, floodplains, vleis and seeps) provide in terms of support planning and decision-making.

The wetland benefits included in the WET-EcoServices model are selected based on their importance for South African wetlands, and how readily these can be assessed. Benefits such as groundwater recharge or discharge and biomass export may be important but are difficult to characterise at a rapid assessment level, and have thus been excluded. Detailed in **Table 6-3** are the ecosystem services that are assessed during a rapid field assessment.

Table 6-1 Impact scores and Present Ecological State categories

ECOLOGICAL CATEGORY	DESCRIPTION	COMBINED IMPACT SCORE
A	**Unmodified, natural**	0-0.9
B	**Largely natural with few modifications**. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1-1.9
C	**Moderately modified**. A moderate change in ecosystem processes and loss of natural habitat has taken place but the natural habitat remains predominantly intact.	2-3.9
D	**Largely modified**. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4-5.9
E	**Seriously modified**. The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	6-7.9
F	**Critically modified**. Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8-10
Source:	Modified from Macfarlane *et al.* (2008)	

Table 6-2 Trajectory of change classes, scores and symbols

TRAJECTORY CLASS	DESCRIPTION	CHANGE SCORE	CLASS RANGE	SYMBOL
Improve markedly	Condition is likely to improve substantially over the next five years	2	1.1 to 2	↑↑
Improve	Condition is likely to improve over the next five years	1	.3 to 1	↑
Remains stable	Condition is likely to remain stable over the next five years	0	-0.2 to +0.2	→
Deterioration slight	Condition is likely to deteriorate slightly over the next five years	-1	-0.3 to -1	↓
Deterioration substantial	Condition islikely todeteriorate substantially over the next five years	-2	-1.1 to 2	↓↓
Source:	Modified from Macfarlane *et al.* (2008)			

Table 6-3 WET-EcoServices model of wetland ecosystem services (Kotze *et al.* 2000)

Ecosystem Services supplied by Wetlands	Indirect Benefits	Regulating & supporting benefits	Flood attenuation	The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream
			Streamflow regulation	Sustaining streamflow during low flow periods
			Sediment trapping	The trapping and retention in the wetland of sediment carried by runoff waters
			Phosphate assimilation	Removal by the wetland of phosphates carried by runoff waters
			Nitrate assimilation	Removal by the wetland of nitrates carried by runoff waters
			Toxicant assimilation	Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff water
			Erosion control	Controlling of erosion at the wetland site, principally through the protection provided by vegetation
			Carbon storage	The trapping of carbon by the wetland, principally as soil organic matter
		Biodiversity maintenance		Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity
		Biodiversity maintenance is not an ecosystem service as such, but encompasses attributes widely acknowledged as having potentially high value to society		
	Direct Benefits	benefits Provisioning	Provision of water for human use	The provision of water extracted directly from the wetland for domestic, agriculture or other purposes
			Provision of harvestable resources	The provision of natural resources from the wetland, including livestock grazing, craft plants, fish, etc.
			Provision of cultivated foods	The provision of areas in the wetland favourable for the cultivation of foods
		benefits Cultural	Cultural heritage	Places of special cultural significance in the wetland, e.g., for baptisms or gathering of culturally significant plants
			Tourism and recreation	Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife
			Education and research	Sites of value in the wetland for education or research

6.3.6 Wetland Ecological Importance & Sensitivity (EIS)

The assessment of wetland EIS was based on the DWAF (1999) guidelines. According to these guidelines, the "ecological importance" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to a system's ability to resist disturbance and its capability to recover from disturbance once this has occurred.

A wetland's EIS was then used to determine its Ecological Management Class (EMC). For this, a series of 10 determinants for EIS are assessed on a scale of 0 to 4, where 0 indicates no importance, and Level 4 indicates very high importance (**Table 6-4**). The median of the determinants is then used to assign a wetland's EMC (**Table 6-5**).

The determinants assessed include:

PRIMARY DETERMINANTS

- Rare and endangered species - interpreted as Red Data and other Conservation Important (CI) species.
- Populations of unique species.
- Species / Taxon richness.
- Diversity of habitat types or features.
- Migration route/breeding and feeding site for wetland species.
- Sensitivity to changes in the natural hydrological regime.
- Sensitivity to water quality changes.
- Flood storage, energy dissipation and particulate/element removal.

MODIFYING DETERMINANTS

- Protected status.
- Ecological integrity.

Table 6-4 Scoring guideline

SCORE GUIDELINE	CONFIDENCE RATING
Very high = 4 High = 3	Very high confidence = 4 High confidence = 3
Moderate = 2 Marginal/Low = 1 None = 0	Moderate confidence = 2 Marginal/Low confidence = 1

Table 6-5 Ecological importance and sensitivity categories – Interpretation of median scores for biotic and habitat determinants

RANGE OF MEDIAN	ECOLOGICAL IMPORTANCE & SENSITIVITY (EIS)	RECOMMENDED EMC
>3 and <=4	**Very high** Wetlands that are considered ecologically important and sensitive on a national / international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	A
>2 and <=3	**High** Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	B
>1 and <=2	**Moderate** Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	C

RANGE OF MEDIAN	ECOLOGICAL IMPORTANCE & SENSITIVITY (EIS)	RECOMMENDED EMC
>0 and <=1	**Low/Marginal** Wetlands which are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications.They play an insignificant role in moderating the quantity and quality of water of major rivers.	D

6.3.7 Buffers

A buffer is a strip of land surrounding a wetland in which activities are controlled or restricted. Wetland buffers serve to: reduce the impact of adjacent land uses; slow potentially erosive run-off; capture sediments; absorb nutrients; and provide habitats for wetland-dependant organisms.

The Gauteng Minimum Biodiversity Guidelines were used to assign a buffer to the wetlands(GDARD, 2014). These guidelines refer to a minimum of a 50m buffer from the edge of the watercourse outside of the urban edge.

6.3.8 Study Limitations

- Wetland assessment techniques are inherently subjective.
- The EIS methodology was designed for floodplain systems.
- The boundary determined by infield wetland delineation can often occur within a certain tolerance because of the potential for the change in gradient of the wetness zones within wetlands.
- The modification of the soil profile related to agricultural activities and the modification of the hydrological conditions within disturbed sites limits the accuracy of the resulting boundary as the sampling methodology relies heavily on interpretation of undisturbed soil morphology and characteristic.
- The use of vegetation indicators (seasonal and temporary zones) was limited due to the disturbance levels on site.

6.4. 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 6-6**);
- Impact duration (**Table 6-7**);
- Potential impact intensity (**Table 6-8**);
- Impact reversibility (high, moderate, low or irreversible);
- Irreplaceability of the impacted resource (high, moderate, low or replaceable);

- Impact probability (**Table 6-9**);
- Our confidence in the ratings (high, moderate or low);

Overall impact significance (**Table 6-10**) is calculated as:

Impact significance = Impact magnitude x Impact probability

where:

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

Table 6-6 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 6-7 Rating of impact duration

DURATION DESCRIPTION	SCORE
Temporary (less than 2 years) or duration of the construction period. This impact is fully reversible. *E.g. the construction noise temporary impact that is highly reversible as it will stop at the end of the construction period*	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. *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*	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. *E.g. The loss of a paleontological resource on site caused by construction activities is permanent and would be irreversible.*	5

Table 6-8 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[4] (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 / sever impact on quality of life[5], individual economic loss	High	8
Potential to reduce environmental quality – air, soil, water. Potential Loss of habitat, loss of heritage, reduced amenity	Medium	4
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 6-9 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 6-10 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.

[4] *Note that a loss of species is a global issue and is differentiated from a loss of "floral/faunal" populations.*

[5] *Note 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.*

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 2527BD and is immediately adjacent to 2528AC. These two QDGs yielded 289 species within 71 families. The dominant families being, POACEAE, FABACEAE and ASTERACEAE (

Table 7-1), **with** the graminoids (grasses) representing 2727%, herbs representing 27.27%, and the wooded component representing over 29% 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)**.** However, a large component of the sampled vegetation also represented succulent species.

Table 7-1 Top 12 dominant families and most dominant growth forms obtained from the POSA website for the QDS 2527BD and 2528AC and on site

IMPORTANT FAMILIES	No. OF SPP	GROWTH FORMS	% TOTAL SPP	ON SITE
POACEAE	75	Graminoid	27.27	**26.76**
FABACEAE	25	Herb	27.27	**17.86**
ASTERACEAE	23	Shrub to Small Trees	16.73	**10.71**
MALVACEAE	19	Dwarf shrub	9.45	**5.36**
APOCYNACEAE	10	Geophyte	4	8.93
LAMIACEAE	8	Climber, herb	2.91	1.79
ACANTHACEAE	8	Tree	2.91	3.57
CYPERACEAE	7	Cyperoid	2.55	1.79
RUBIACEAE	7	Bryophyte	1.82	-
ANACARDIACEAE	6	Hydrophyte	1.09	1.79
CONVOLVULACEAE	6	Parasite	1.09	-
COMBRETACEAE	5	Succulents	-	16.07

*mainly dominated by alien species

7.1.2 On Site - Vegetation Communities

From the field investigations the study area was relatively flat with limited remaining natural vegetation (**Figure 7-1** and **Figure 7-3**). There were, however, areas that could be grouped into different communities and are defined as follows:

- Woodland / Bushveld Habitats

- Open *Acacia* Sandy Bushveld
- Mixed Bushclumps
- *Acacia* Woodland

- Transformed (Habitat In Recovery)
  - *Acacia Woodland in recovery (Previous Crop Areas)*
- Transformed
  - Agriculture – Crop farming including Vegetable Crops
  - Built Up areas including the piggery, effluent dam and canal
  - Transformed/Disturbed Areas

Table 7-2 Broad Habitat/Vegetation communities

Vegetation Community	Conservation Significance	Area - Ha	Area -%
Woodland / Bushveld Habitats			
Open *Acacia* Sandy Bushveld	**Moderate-High**	0.21	2.43
Mixed Bushclumps	**Moderate**	0.08	0.92
Acacia Woodland	**Moderate**	2.94	33.52
Transformed (Habitat In Recovery)			
Acacia Woodland in recovery (Previous Crop Areas)	**Moderate-Low**	2.14	24.45
Transformed			
Agriculture			
Vegetable Crops	**Low**	0.095	1.09
Crop Farming (Turf Soils)	**Low**	1.60	18.23
Past Crop Farming (Sandy Soils)	**Low**	0.87	9.96
Built Up			
Effluent Dam and Canal	**Low**	0.058	0.66
Built-Up - Housing & Piggery	**Low**	0.35	3.97
Transformed/Disturbed Areas	**Low**	0.42	4.76

For the Study Site, the *Acacia* Woodland contained the most coverage (33.52%) while the recovery woodland areas (previously farmed areas) dominated 24.45%. The structure of the recovery woodland unit was dominated by *Acacia tortilis* and *Acacia karroo* at shrub height and herbaceous species such as *Schkuhria pinnata, Bothriochloa insculpta, Hibiscus trionum, Aristida meridionalis* and *Chloris virgata*. The 'natural' *Acacia* Woodland showed a higher species richness and it's structure consisted of a taller fine-leaved canopy (*Acacia* and *Boscia* species) with broad-leaved shrubs such as *Grewia flava* and *Gymnosporia* in the understorey.

The most unique habitat on site was the *Open Acacia Sandy Bushveld.* Only a portion of this unit lies within the Study Site, however, it extends towards the east and south east of the site. This habitat was also expected to occur within the north eastern corner of the site, due to the soil structure but the area has been previously cleared for farming practices (**Figure 7-3**). The *Open Acacia Sandy Bushveld* unit also contains the highest diversity of all the units sampled. This included *Acacia mellifera subsp. mellifera, Kalanchoe paniculata,*

Kalanchoe rotundifolia, Cyanotis speciosa, Justicia flava, Sarcostemma viminale, Asparagus species*, Sansevieria aethiopica, Albuca* species*, Grewia flava, Rhynchosia* and *Blepharis* species.

The remainder of the Study Site consisted of Transformed areas including the Piggery and associated effluent canal and dam, the Crop farming including Vegetable Crops and the housing to the north west.

Species recorded within the sampling area were grouped within the different habitats/vegetation units in **Table 7-3.** Alien species were particularly dominant around the previously farmed areas and around the housing in the north western corner of the Study Site (refer to **Section 7.1.4 below),**

Open Acacia Sandy Bushveld

Acacia Woodland

Acacia Woodland in recovery

Transformed/Disturbed Areas

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

Acacia tortilis subsp. heteracantha

Commicarpus pentandrus

Ornithogalum tenuifolium

Sansevieria aethiopica

Acacia mellifera

Leucas cf martinicensis

Figure 7-2 Examples of Species found on site

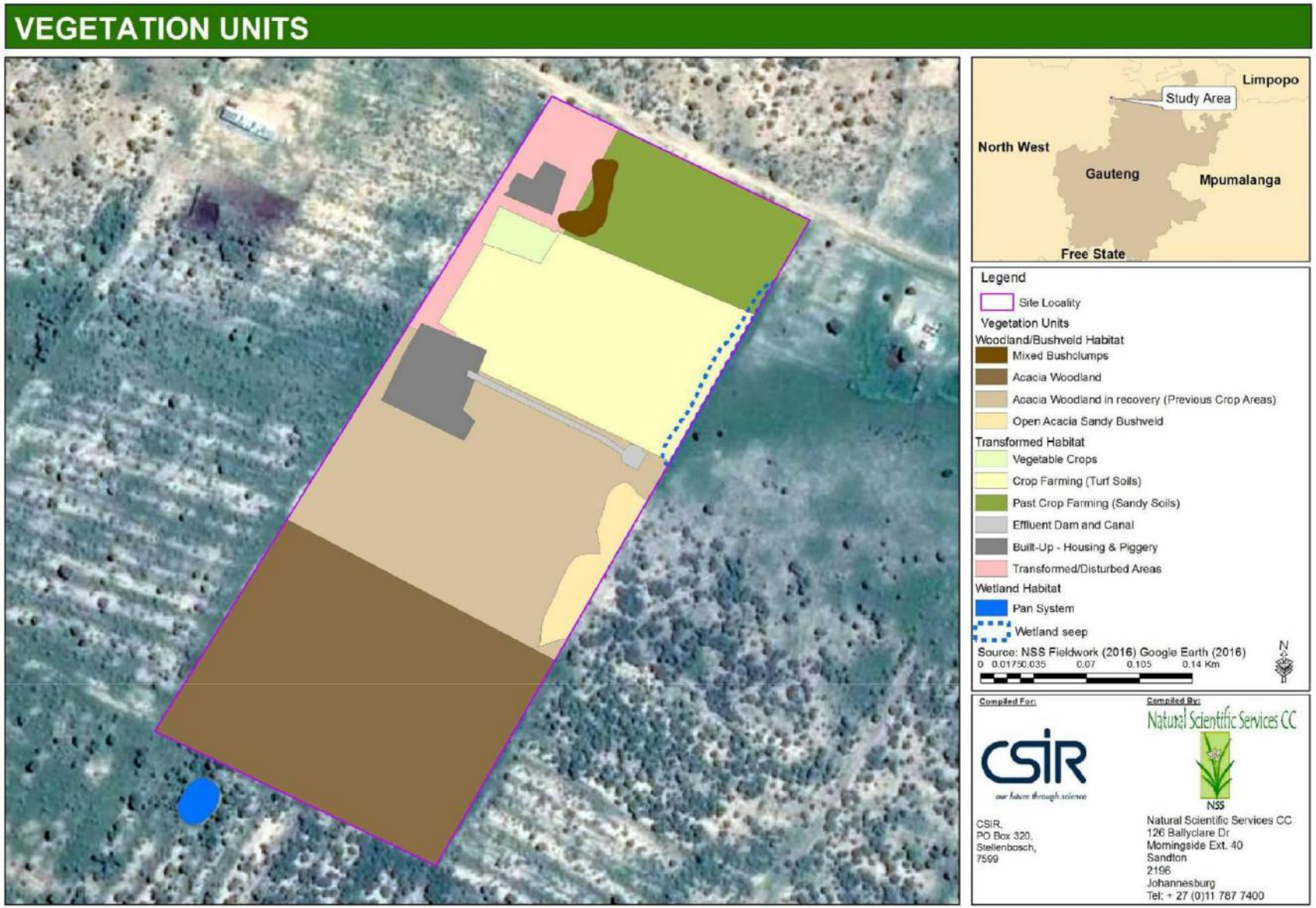


Figure 7-3 Vegetation communities within the study area

Table 7-3 Plant species identified within the different habitats

Family		Species	Threatstatus	Growth forms	Distu*bed:	OpenSandy:	AcaciaWood:	*ecove*y:	MixedBush:
ACANTHACEAE		*Blepharis spp*	LC	Herb		*			
ACANTHACEAE		*Justicia flava (Vahl) Vahl*	LC	Dwarf shrub		*			
AMARANTHACEAE		*Aerva leucura Moq.*	LC	Herb		*	*		*
AMARANTHACEAE	*	*Gomphrena celosioides Mart.*	NE	Herb			*		
ANACARDIACEAE		*Sclerocarya birrea (A.Rich.) Hochst. subsp. caffra (Sond.)*	LC	Tree					*
APOCYNACEAE		*Duvalia polita N.E.Br.*	LC	Succulent		*			
APOCYNACEAE	*	*Nerium oleander L.*	NE	Shrub					*
APOCYNACEAE		*Sarcostemma viminale (L.) R.Br. subsp. viminale*	LC	Climber		*			
ASPARAGACEAE		*Asparagus cf densiflorus (Kunth) Jessop*	LC	Shrub		*			
ASPHODELACEAE		*Aloe cf dayvana Baker*	LC	Succulent		*			
ASTERACEAE		*Denekia capensis Thunb.*	LC	Herb			*		
ASTERACEAE	*	*Schkuhria pinnata (Lam.) Kuntze ex Thell.*	NE	Herb	*	*	*	*	
ASTERACEAE		*Tarchonanthus camphoratus L.*	LC	Shrub		*			
ASTERACEAE		*Xanthium strumarium l.*	NE	Dwarf shrub					
ASTERACEAE	*	*Zinnia peruviana (L.) L.*	NE	Herb			*		
CACTACEAE	*	*Cereus jamacaru DC.*	NE	Succulent					*
CACTACEAE		*Opuntia ficus-indica (L.) Mill*	NE	Succulent					
CAPPARACEAE		*Boscia albitrunca (Burch.) Gilg & Gilg-Ben.*	LC	Shrub, tree			*		
COMMELINACEAE		*Cyanotis speciosa (L.f.) Hassk.*	LC	Succulent		*			
CONVOLVULACEAE		*Convolvulus spp*	LC	Herb	*			*	
CRASSULACEAE		*Kalanchoe paniculata Harv.*	LC	Succulent		*			
CRASSULACEAE		*Kalanchoe rotundifolia (Haw.) Haw.*	LC	Succulent		*			
CYPERACEAE		*Cyperus spp*	LC	Herb,			*		

Family		Species	Threatstatus	Growth forms	Distu*bed:	OpenSandy:	AcaciaWood:	*ecove*y:	MixedBush:
				succulent					
CYPERACEAE		*Scirpus spp*	LC	Cyperoid			*		
DRACAENACEAE		*Sansevieria aethiopica*	LC	Geophyte		*			
EUPHORBIACEAE		*Jatropha spp*	LC	herb			*		
FABACEAE		*Acacia karroo Hayne*	LC	Shrub	*	*		*	
FABACEAE		*Acacia mellifera (Vahl) Benth. subsp. mellifera*	LC	Shrub		*			
FABACEAE		*Acacia tortilis (Forssk.) Hayne subsp. heteracantha (Burch.) Brenan*		Shrub		*	*	*	
FABACEAE		*Rhynchosia spp*	LC	Herb		*			
FABACEAE	*	*Sesbania bispinosa (Jacq.) W.Wight var. bispinosa*	NE	Tree	*				
GERANIACEAE		*Monsonia angustifolia E.Mey. ex A.Rich*	LC	Herb		*			
HYACINTHACEAE		*Albuca spp*	LC	Geophyte		*			
HYACINTHACEAE		*Drimiopsis cf. burkei Baker subsp. burkei*	LC	Geophyte		*			
HYACINTHACEAE		*Ledebouria cf. revoluta*	LC	Geophyte		*		*	
HYACINTHACEAE		*Ornithogalum tenuifolium F.Delaroche subsp. tenuifolium*	NE	Geophyte					*
MALVACEAE		*Grewia flava DC.*	LC	Shrub		*			
MALVACEAE	*	*Hibiscus trionum L.*	NE	Herb		*		*	
MARSILEACEAE		*Marsilea macrocarpa C.Presl*	LC	Hydrophyte			*		
NYCTAGINACEAE		*Commicarpus pentandrus*	LC	Scrambler				*	
POACEAE		*Aristida meridionalis Henrard*	LC	Graminoid	*			*	
POACEAE		*Bothriochloa insculpta (Hochst. ex A.Rich.) A.Camus*	LC	Graminoid				*	
POACEAE		*Chloris virgata Sw.*	LC	Graminoid	*			*	
POACEAE		*Digitaria eriantha Steud.*	LC	Graminoid					*
POACEAE		*Eragrostis cf. patentipilosa Hack. (pseudoscleranthe)*	LC	Graminoid		*			

Family		Species	Threatstatus	Growth forms	Distu*bed:	OpenSandy:	AcaciaWood:	*ecove*y:	MixedBush:
POACEAE		*Eragrostis spp*	LC	Graminoid			*		
POACEAE		*Panicum maximum Jacq.*	LC	Graminoid					
POACEAE		*Panicum sp.*	LC	Graminoid				*	
POACEAE	*	*Paspalum dilatatum Poir.*	NE	Graminoid			*		
POACEAE		*Sorghum versicolor Andersson*	LC	Graminoid		*		*	
POACEAE		*Sporobolus africanus (Poir.) Robyns & Tournay*	LC	Graminoid					
POACEAE		*Sporobolus pectinatus Hack.*	LC	Graminoid					
POACEAE		*Themeda triandra Forssk.*	LC	Graminoid				*	
POACEAE		*Tragus berteronianus Schult.*	LC	Graminoid		*			
POACEAE		*Urochloa mosambicensis (Hack.) Dandy*	LC	Graminoid					*
PORTULACACEAE		*Portulaca spp*	LC	Succulent		*		*	
RHAMNACEAE		*Ziziphus mucronata Willd. subsp. mucronata*	LC	Shrub			*		
SOLANACEAE		*Solanum panduriforme Droge ex Dunal*	LC	Dwarf shrub			*		

KEY:
Open Sandy: Open Acacia Sandy Bushveld
Mixed Bush: Mixed Bushclumps
Acacia Wood: Acacia Woodland
Recovery: Acacia Woodland in recovery (Previous Crop Areas)
*Alien species; DEC-Declining; LC-Least Concern; NE-Not Evaluated

7.1.3 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 60% transformed through agricultural practices 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 77 Red Data listed species (**Table 7-4**) out of a possible 2074 species within Gauteng Province (including Data Deficient species) of which 1 species are Critically Endangered (CR), 10 Endangered (EN), 13 are Vulnerable (VU) and 19 are Near Threatened.

Table 7-4 Numbers of conservation important plant species per Red Data category within South Africa and Gauteng (date accessed: April 2016)

Threat Status	South Africa	GAUTENG	2527BD
EX (Extinct)	28	1	-
EW (Extinct in the wild)	7	0	-
CR PE (Critically Endangered, Possibly Extinct)	57	0	-
CR (Critically Endangered)	332	1	-
EN (Endangered)	716	10	1
VU (Vulnerable)	1217	13	-
NT (Near Threatened)	402	19	-
Critically Rare (known to occur only at a single site)	153	0	-
Rare (Limited population but not exposed to any direct or potential threat)	1212	4	-
Declining (not threatened but processes are causing a continuing decline in the population)	47	9	1
LC (Least Concern)	13 856	1997	266
DDD (Data Deficient - Insufficient Information)	348	1	-
DDT (Data Deficient - Taxonomically Problematic)	904	19	1
Total spp (including those not evaluated)	**23 399**	**2074**	**289**

**Date accessed – June 2016

From the POSA website (2527BD and 2528CA QDS) as well as surrounding studies, a number of CI species has been recorded in the greater region (**Table 7-5**). This includes the Endangered *Brachystelma discoideum,* which could occur within the more sandy *Open Acacia Sandy Bushveld* within the Study Site. The survey, however, was conducted outside of its flowering time. From the 9 species listed, habitat potentially exists for approximately 10 species. In terms of identification the following species could be identified outside of their flowering times: *Hypoxis hemerocallidea; Callilepis leptophylla; Boophone disticha; Myrothamnus flabellifolius.* The survey was conducted in late summer, when a number of the species were not in their flowering time. For example, species such as the three *Drimia* species are difficult to detect within the grass cover after flowering. These species would have all finished flowered before April (the time of the survey).

Although no Red Listed species were recorded on the site, the Protected *Duvalia polita* (**Figure 7-4**) was located on site. This species is considered Protected species under the Nature Conservation Ordinance, 12 of 1983. Protected Species may not be cut, disturbed, damaged, destroyed without obtaining a permit from Gauteng Province or a delegated authority.

Duvalia polita

Sclerocarya birrea subsp*. caffra*

Figure 7-4 Photographs of Conservation Important plant species on Site

In terms of 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 under a licence granted by the Minister.

Table 7-5 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
MYROTHAMNACEAE	*Myrothamnus flabellifolius Welw.*	DDT	Spring-Summer	In shallow soil over sheets of rock	No Habitat
HYPOXIDACEAE	*Hypoxis hemerocallidea*	DEC	Summer	Occurs in a wide range of habitats	Possible
HYACINTHACEAE	*Drimia altissima (L.f.) Ker Gawl.*	Declining	September-February	Hot, dry bushveld and thicket.	Possible
HYACINTHACEAE	*Drimia elata Jacq.*	DDT	Summer	Grassland and Bushveld	Possible
HYACINTHACEAE	*Drimia sanguinea (Schinz) Jessop*	NT	August-December	Open veld and scrubby woodland in a variety of soil types.	Possible
ASTERACEAE	*Callilepis leptophylla Harv.*	Declining	August-January & May	Grassland or open woodland, often on rocky outcrops or rocky hillslopes.	Possible
APOCYNACEAE	*Brachystelma discoideum R.A.Dyer*	EN	November	Savanna in gravelly sandy soil.	Possible
AMARYLLIDACEAE	*Boophone disticha (L.f.) Herb.*	Declining	October-January	Dry grassland and rocky areas.	Possible
AMARYLLIDACEAE	*Crinum macowanii Baker*	Declining	October-January	Grassland, along rivers, in gravelly soil or on sandy flats.	Possible
FABACEAE	*Cullenholubii*(BurttDavy) C.H.Stirt.	VU	Unknown	Springbokvlakte Thornveld	Possible
POACEAE	*Mosdenia leptostachys*	Regional Endemic		Springbokvlakte Thornveld	Possible

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

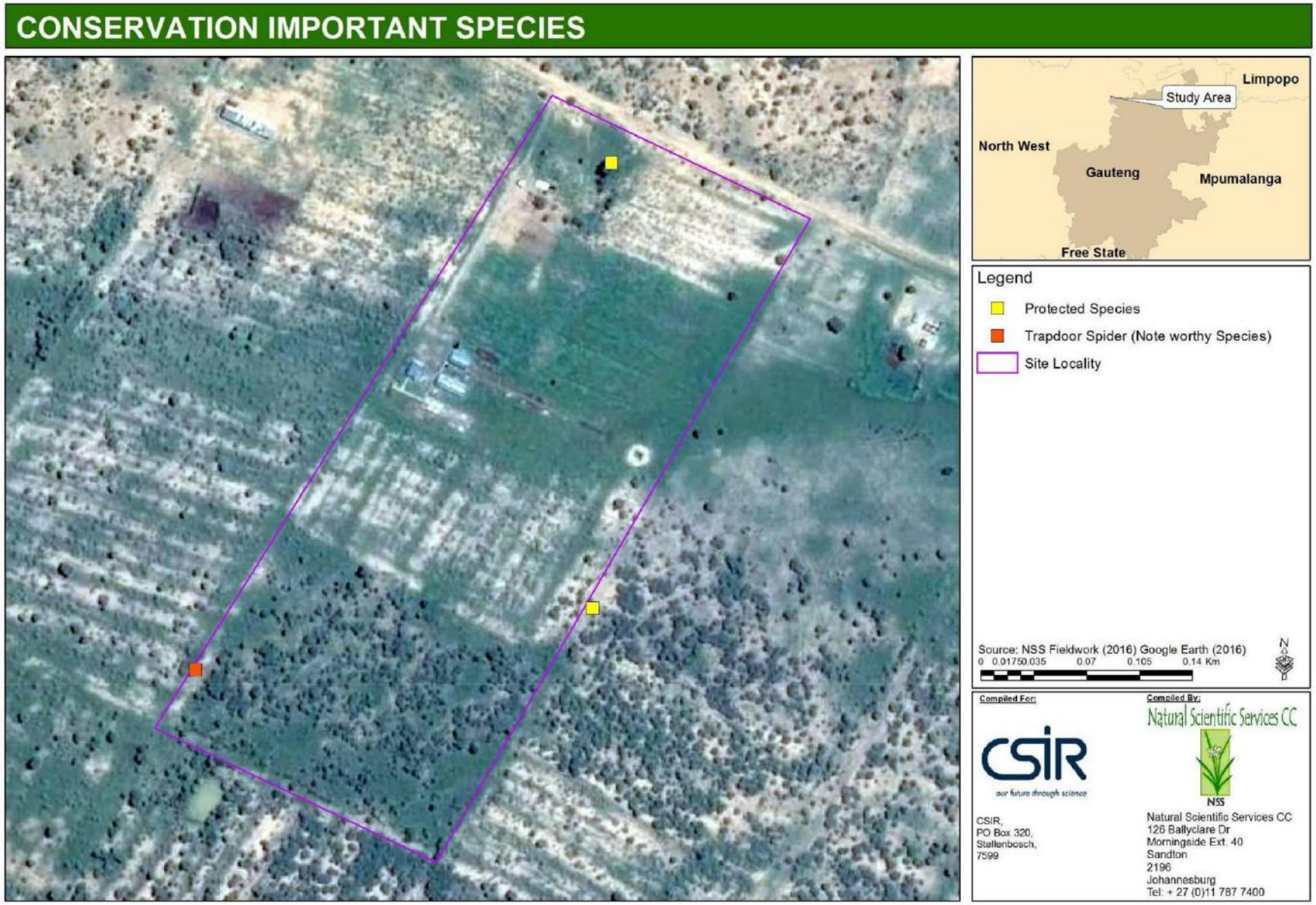


Figure 7-5 Conservation Important species on Site

7.1.4 Alien and Invasives Species

Alien, especially invasive[6] plant species are a major threat to the ecological functioning of natural systems and to the productive use of land. The Study Site is heavily transformed but does not present dense infestations of alien species. Although a number of indigenous pioneer species are present. (**Figure 7-6**).

Alien Invasive Categories according to NEM:BA; Act 10 of 2004:

Category 1a

Species requiring compulsory

Category 1b

Invasive species controlled by an invasive species management

Category 2

Invasive species controlled by area

Category 3

Invasive species controlled by

In the brief scan of the site, a minimum of 10 species were recorded. Four of these were Category Invasive species (**Table 7-6**). *Xanthium strumarium* was mainly associated with the crop fields whereas *Nerium oleander* was found around the houses. *Cereus jamacaru* and *Opuntia ficus-indica* were located within the Wooded *Acacia* patches.

Within the open wooded areas, species such as *Zinnia peruviana* were present within the shade of the trees. *Gomphrena celosioides* and *Schkuhria pinnata* were prevalent in the fallow fields.

Table 7-6 Alien and Invasive Species detected during the survey

Family	Species	Growth forms	CARA	NEMBA
AMARANTHACEAE	*Gomphrena celosioides Mart.*	Herb	Weed	Weed
APOCYNACEAE	*Nerium oleander L.*	Shrub	1	1b
ASTERACEAE	*Schkuhria pinnata (Lam.) Kuntze ex Thell.*	Herb	Weed	Weed
ASTERACEAE	*Xanthium strumarium*	Herb	1	1
ASTERACEAE	*Zinnia peruviana (L.) L.*	Herb	Weed	Weed
CACTACEAE	*Cereus jamacaru DC.*	Succulent, tree	1	1b
CACTACEAE	*Opuntia ficus-indica (L.) Mill*	Succulent	1	1b
FABACEAE	*Sesbania bispinosa (Jacq.) W.Wight var. bispinosa*	tree	Weed	Weed
MALVACEAE	*Hibiscus trionum L.*	Herb	Weed	Weed
POACEAE	*Paspalum dilatatum Poir.*	Graminoid	Weed	Weed

[6] 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):

Xanthium strumarium

Cereus jamacaru

Opuntia ficus-indica

Gomphrena celosioides

Figure 7-6 Photographs of Alien species on Site

7.2. Faunal Communities

The flat, relatively homogenous thornveld of the Springbokvlakte, together with the lack of rocky outcrops or open waterbodies of any significance, presupposes a modest diversity of fauna. As such only a limited number of Conservation Important Species (CIS) are expected to occur on site and even fewer (if any) are likely to be resident or entirely dependent on it. The Legae La Thlago study site is situated in area that has received relatively poor museum/atlassing coverage and consequently any database-generated species lists certainly underestimate the actual diversity.

Gaika blue
(*Zizula hylax*)

Red tip
(*Colotis antevippe gavisa*)

Grass jewel
(*Chilades trochylus*)

Spotted joker
(*Byblia ilithyia*)

African Sacred Ibis
(*Threskiornis aethiopicus*)

Southern Pale Chanting
(*Goshawk Melierax canorus*)

Magpie
(*Shrike Corvinella melanoleuca*)

White-fronted Bee-eater
(*Merops bullockoides*)

Sand frog
(Tomopterna sp.)

African Purseweb Spider
(*Calommata simoni*)

Community nest spiders
(*Stegodyphus* sp.)

Banded-legged Golden Orb-web Spider
(*Nephila senegalensis*)

Figure 7-7 Examples fauna observed on site

In total two mammal, 50 bird, one frog, 15 butterfly and 3 spider species were detected on site during the ecoscan (**Table 7-7**)**.** Some examples are illustrated in **Figure 7-7**. Lists of potentially occurring faunal species for the study area (based on nation-wide distribution maps and habitat availability are presented in **Appendices 2-8**. Potentially occurring CIS are summarised per faunal group in **Table 7-8** to **Table 7-12**.

Table 7-7 Faunal species detected on site

SPECIES	COMMON NAME	SPECIES	COMMON NAME
	Mammals		
Lepus saxatilis	Scrub Hare	*Cryptomys hottentotus*	Common Mole-rat
	Birds		
Bubulcus ibis	Cattle Egret	*Parisoma subcaeruleum*	Chestnut-vented Tit-babbler
Threskiornis aethiopicus	African Sacred Ibis	*Bradornis mariquensis*	Marico Flycatcher
Bostrychia hagedash	Hadeda Ibis	*Anthus cinnamomeus*	African Pipit
Elanus caeruleus	Black-shouldered Kite	*Laniarius atrococcineus*	Crimson-breasted Shrike
Melierax canorus	Southern Pale Chanting Goshawk	*Tchagra australis*	Brown-crowned Tchagra
Numida meleagris	Helmeted Guineafowl	*Corvinella melanoleuca*	Magpie Shrike
Eupodotis ruficrista	Red-crested Korhaan	*Nilaus afer*	Brubru
Vanellus coronatus	Crowned Lapwing	*Acridotheres tristis*	Common Myna
Cursorius temminckii	Temminck's Courser	*Lamprotornis nitens*	Cape Glossy Starling
Columba guinea	Speckled Pigeon	*Nectarinia talatala*	White-bellied Sunbird
Streptopelia capicola	Cape Turtle Dove	*Nectarinia amethystina*	Amethyst Sunbird
Corythaixoides concolor	Grey Go-away-bird	*Plocepasser mahali*	White-browed Sparrow-weaver
Urocolius indicus	Red-faced Mousebird	*Passer motitensis*	Great Sparrow
Merops bullockoides	White-fronted Bee-eater	*Sporopipes squamifrons*	Scaly-feathered Finch
Coracias caudatus	Lilac-breasted Roller	*Ploceus velatus*	Southern Masked-weaver
Tockus leucomelas	Southern Yellow-billed Hornbill	*Pytilia melba*	Green-winged Pytilia
Tricholaema leucomelas	Acacia Pied Barbet	*Uraeginthus angolensis*	Blue Waxbill
Mirafra sabota	Sabota Lark	*Granatina granatina*	Violet-eared Waxbill
Hirundo rustica	Barn Swallow	*Ortygospiza atricollis*	African Quailfinch
Dicrurus adsimilis	Fork-tailed Drongo	*Vidua regia*	Shaft-tailed Whydah
Corvus albus	Pied Crow	*Vidua chalybeata*	Village Indigobird
Erythropygia paena	Kalahari Scrub-robin	*Vidua paradisaea*	Long-tailed Paradise-whydah
Calamonastes fasciolatus	Barred Wren-warbler	*Crithagra mozambicus*	Yellow-fronted Canary
Cisticola chiniana	Rattling Cisticola	*Crithagra atrogularis*	Black-throated Canary
Prinia flavicans	Black-chested Prinia	*Emberiza tahapisi*	Cinnamon-breasted Bunting
	Frogs		
Tomopterna sp.	Sand frog		
	Butterflies		
Belenois aurota	Brown-veined white	*Hypolimnas misippus*	Common diadem
Catopsilia florella	African migrant	*Junonia hierta cebrene*	Yellow pansy
Eurema brigitta brigitta	Broad-bordered grass yellow	*Junonia oenone oenone*	Blue pansy
Pinacopteryx eriphia eriphia	Zebra white	*Vanessa cardui*	Painted lady
Acraea neobule neobule	Wandering donkey acraea	*Anthene amarah amarah*	Black-striped hairtail
Byblia ilithyia	Spotted joker	*Chilades trochylus*	Grass jewel
Danaus chrysippus orientis	African monarch	*Zizula hylax*	Gaika blue

SPECIES	COMMON NAME	SPECIES	COMMON NAME
Arachnids			
Calommata simoni	African Purseweb Spider	*Nephila senegalensis*	Orb web
Stegodyphus sp.	Community nest spider		

7.2.1 Mammals

Of the approximately 110 regionally occurring species just over 70 species may conceivably occur (LO of 1, 2 or 3 in **Appendix 2**) on site based on distribution and the availability of suitable habitat (mostly rodents, insectivores, bats and small carnivores). Atlassing projects list 36 species for the QDS (Friedmann & Daly, 2004; MammalMap, 2016). During the site visit four mammal species were detected.

No CI mammal species were detected on site. However as many as 24 of the 31 regionally occurring non-game CIS could occur sporadically on site (LO of 2 or 3). No golden moles are likely to occur, based on the distribution data at hand (golden mole distributions are far from being accurately delimited). Suitable conditions appear present for eight of the nine **DD** shrew species the exception being Swamp Musk Shrew which requires wetter habitat (effective sampling for presence of these shrew species would require trapping which was out of the scope of this study). The **NT** Southern African Hedgehog may occur on site. Hedgehogs inhabit a diversity of habitats in the temperate to semi-arid interior of South Africa where there is thick, dry vegetation cover suitable for nesting, and an abundance of insects and other food items (Skinner & Chimimba 2005; Stuart & Stuart 2007). Although widespread, hedgehogs are nowhere common.

Two of the six regionally occurring bat species may occur namely **NT** Geoffroy's Horseshoe Bat and Bushveld Horseshoe Bat given their less strict dependence on subterranean (cave) roosting habitat (which is distinctly lacking in surrounding areas) and their ability to also make use of tree hollows (Monadjem *et al*. 2010).

In terms of rodents Single-striped Mouse and Bushveld Gerbil likely are likely to occur site. Although listed as **DD**, both are fairly widespread and common species. White Tailed Rat (**EN**) may occur based on the presence of suitable substrate and vegetation cover.

Seven (non-game) CI carnivore species namely Brown Hyaena Leopard, Black-footed Cat (**VU**), Serval (**NT**), Honey Badger (**NT**), African Weasel (**DD**) and Cape Fox (**PS**), may occur sporadically, although persecution is likely to be high given the amount of livestock and game farms in the area and the proximity to extensive rural settlements and domestic cats and dogs. Aardvark (**PS**) is likely to occur but no signs of their presence in the form of burrows, spoor or scrapings were detected. African Weasel may are all high likely to occur.

Table 7-8 Present and potentially occurring CI mammal species

ORDER & SPECIES [1] [2,4]	COMMON NAME [2,4]	CONSERVATION STATUS			O [2,4,6]	ATLAS (N) [2,6]
		GLOBAL IUCN [5]	S.A. RED DATA [2,4]	S.A. NEM:BA [3]		
MACROSCELIDEA (Elephant-shrews)						
Elephantulus brachyrhynchus	Short-snouted Elephant-shrew	LC (U)	**DD**	-	2	
EULIPOTYPHLA (Hedgehogs & shrews)						
Myosorex varius	Forest Shrew	LC (S)	**DD**	-	3	
Suncus lixus	Greater Dwarf Shrew	LC (U)	**DD**	-	3	
Suncus varilla	Lesser Dwarf Shrew	LC (U)	**DD**	-	3	
Suncus infinitesimus	Least Dwarf Shrew	LC (U)	**DD**	-	3	
Crocidura mariquensis	Swamp Musk Shrew	LC (U)	**DD**	-	4	
Crocidura fuscomurina	Tiny Musk Shrew	LC (U)	**DD**	-	3	
Crocidura cyanea	Reddish-grey Musk Shrew	LC (S)	**DD**	-	2	
Crocidura silacea	Lesser Grey-brown Musk Shrew	LC (S)	**DD**	-	3	
Crocidura hirta	Lesser Red Musk Shrew	LC (U)	**DD**	-	3	
Atelerix frontalis	Southern African Hedgehog	LC (S)	**NT**	-	2	
CHIROPTERA (Bats)						
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC (U)	**NT**	-	3	
Rhinolophus darlingi	Darling's Horseshoe Bat	LC (U)	**NT**	-	4	
Rhinolophus blasii	Blasius's Horseshoe Bat	LC (D)	**NT**	-	4	
Rhinolophus simulator	Bushveld Horseshoe Bat	LC (D)	**NT**	-	3	
Cloeotis percivali	Percival's Short-eared Trident Bat	LC (U)	**VU**	-	4	
Miniopterus natalensis	Natal Long-fingered Bat	LC (U)	**NT**	-	4	
RODENTIA (Rodents)						
Graphiurus platyops	Rock Dormouse	LC (U)	**DD**	-	4	
Mystromys albicaudatus	White-tailed Rat	**EN (D)**	**EN**	-	3	
Lemniscomys rosalia	Single-striped Mouse	LC (S)	**DD**	-	2	
Dasymys incomtus	Water Rat	LC (U)	**NT**	-	2	
Tatera leucogaster	Bushveld Gerbil	LC (S)	**DD**	-	2	
CARNIVORA (Carnivores)						
Hyaena brunnea	Brown Hyaena	**NT (D)**	**NT**	**PS**	2	
Panthera pardus	Leopard	**NT (D)**	LC	**PS**	3	1
Felis nigripes	Black-footed Cat	**VU (D)**	LC	**PS**	3	
Leptailurus serval	Serval	LC (S)	**NT**	**PS**	2	
Vulpes chama	Cape Fox	LC (S)	LC	**PS**	2	
Lutra maculicollis	Spotted-necked Otter	LC (D)	**NT**	-	4	
Mellivora capensis	Honey Badger	LC (D)	**NT**	-	3	1
Poecilogale albinucha	African Weasel	LC (U)	**DD**	-	2	
TUBULIDENTATA (Aardvark)						
Orycteropus afer	Aardvark	LC (U)	LC	**PS**	3	
PERISSODACTYLA (Zebras)						
Ceratotherium simum	White Rhinoceros	**NT (I)**	LC	**PS**	5	
Equus zebra zebra	Cape Mountain Zebra	**VU (U)***	**VU**	**PS**	5	
ARTIODACTYLA (Even-toed ungulates)						
Hippopotamus amphibius	Hippopotamus	**VU (D)**	LC	-	5	1
Connochaetes gnou	Black Wildebeest	LC (I)	LC	**PS**	5	1
Damaliscus pygargus pygargus	Bontebok	LC (S)	**VU**	**PS**	5	1

ORDER & SPECIES [1] [2,4]	COMMON NAME [2,4]	CONSERVATION STATUS			LO [2,4,6]	ATLAS (N) [2,6]
		GLOBAL IUCN [5]	S.A. RED DATA [2,4]	S.A. NEM:BA [3]		
Damaliscus lunatus	Tsessebe	LC (D)	EN	PS	5	
Hippotragus equinus	Roan	LC (D)	VU	EN	5	1
Hippotragus niger niger	Sable	LC (S)	VU	-	5	2
Ourebia ourebi	Oribi	LC (D)	EN	EN	5	

Key

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

Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate; 4 = Low; 5 = May occur as a managed population

Sources: [1]Stuart & Stuart (2007); [2]Friedmann & Daly (2004); [3]ToPS List (2015); [4]Monadjem *et al.* (2010); [5]IUCN (2015-4); [6]MammalMap (2016)

7.2.2 Birds

SABAP data lists 218 species for the area; 181 spp. from SABAP 1 (QDS 2528CA) and 150 spp. from SABAP 2 (pentad 2600_2630). However, the low SABAP sampling effort (12 full protocol SABAP 2 cards) in the area certainly underestimates the true diversity. As such numerous bird species that are known to occur in the greater region were added based on knowledge of their distribution and the availability of suitable habitat, bringing the total regional list to just over 370 species. Many of these species, however, are likely to be precluded by a lack of perennial rivers, open water bodies, mudflats and rocky outcrops such that the number of species actually likely to occur on site is limited to just under 220 species comprising a mix of mainly terrestrial grassland and bushveld birds (**Appendix 3**).

No CI bird species or signs thereof were detected on site nor were any recorded during any of the SABAP surveys in the pentad and QDS. Nevertheless inclusion of species known to occur regionally suggests that some 22 CIS may occur regionally of which 12 may occur sporadically with none expected to be resident or entirely dependent on any one specific habitat feature on site. These include Marabou Stork (**NT**), Abdim's Stork (**NT**), Black Stork (**VU**), Black-winged Pratincole (**NT**), Greater Painted-snipe (**VU**), Secretarybird (**VU**), Cape Vulture (**EN**), Lanner Falcon (**VU**), Red-footed Falcon (**NT**), Verreaux's Eagle (**VU**), Tawny Eagle (**EN**) and European Roller (**NT**).

The lack of perennial rivers or open waterbodies on site likely precludes Pink-backed Pelican (**VU**), Caspian Tern (**VU**), African Grass-owl (**VU**), Maccoa Duck (**NT**), Lesser Jacana (**NT**), Black-winged Pratincole (**NT**), Greater Flamingo (**NT**), Kingfisher (**NT**), Yellow-billed Stork (**EN**) and African Marsh-harrier (**EN**)

Table 7-9 Present and potentially occurring CI bird species

CATEGORY[1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS			LOO 4	ATLAS[4]	
		GLOBAL IUCN[3]	ATLAS (REG/GLOB)[5]	S.A. NEM:BA[2]		SABAP 1	SABAP 2
1. Ocean birds							
Pelecanus rufescens	Pink-backed Pelican	LC (S)	**VU/LC**	-	4		x
Sterna caspia	Caspian Tern	LC (I)	**VU/LC**	-	4		x
Leptoptilos crumeniferus	Marabou Stork	LC (I)	**NT/LC**	-	3	x	x
2. Inland water birds							
Mycteria ibis	Yellow-billed Stork	LC (D)	**EN/LC**	-	4	x	
Ciconia abdimii	Abdim's Stork	LC (D)	**NT/LC**	-	2	x	x
Ciconia nigra	Black Stork	LC (U)	**VU/LC**	-	3	x	
Phoenicopterus roseus	Greater Flamingo	LC (I)	**NT/LC**	-	4	x	x
Glareola nordmanni	Black-winged Pratincole	**NT (D)**	**NT/NT**	-	3		x
3. Ducks & wading birds							
Oxyura maccoa	Maccoa Duck	**NT (D)**	**NT/NT**	-	4		x
Microparra capensis	Lesser Jacana	LC (U)	**NT/LC**	-	4		x
Rostratula benghalensis	Greater Painted-snipe	LC (D)	**VU/LC**	-	3	x	
4. Large terrestrial birds							
Sagittarius serpentarius	Secretarybird	**VU (D)**	**VU/VU**	-	3	x	
Anthropoides paradiseus	Blue Crane	**VU (S)**	**NT/VU**	**PS**	4	x	
5. Raptors							
Gyps coprotheres	Cape Vulture	**VU (D)**	**EN/VU**	**EN**	3	x	x
Falco biarmicus	Lanner Falcon	LC (I)	**VU/LC**	-	3	x	
Falco vespertinus	Red-footed Falcon	**NT (D)**	**NT/NT**	-	3	x	x
Aquila verreauxii	Verreaux's Eagle	LC (S)	**VU/LC**	-	3	x	x
Aquila rapax	Tawny Eagle	LC (S)	**EN/LC**	**EN**	3	x	
Circus ranivorus	African Marsh-harrier	LC (D)	**EN/LC**	-	4	x	
6. Owls & nightjars							
Tyto capensis	African Grass-owl	LC (D)	**VU/LC**	-	4		x
8. Aerial feeders, etc							
Alcedo semitorquata	Half-collared Kingfisher	LC (D)	**NT/LC**	-	4	x	
Coracias garrulus	European Roller	**NT (D)**	**NT/NT**	-	2	x	

Key

Status: D = Declining; EN = Endangered; I = Increasing; LC = Least Concern; NB = Non-breeding; NR = Not Recognised by Birdlife International; NT = Near Threatened; PS = Protected Species; S = Stable; U = Unknown population trend; VU = Vulnerable

Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate; 4 = Low

Sources: [1]Newman (2002); [2]ToPS List (2015); [3]IUCN (2015-4); [4]SABAP(2016); [5]Taylor (2015)

7.2.3 Reptiles

Some 62 reptile species may occur at a regional scale. Of these, six species have been recorded during atlassing projects in the QDS (ReptileMap, 2016) suggesting reptiles have been severely under-sampled in the area (**Appendix 4**). These included Common Dwarf Gecko, Spotted Sandveld Lizard, Yellow-throated Plated Lizard, Speckled Rock and Variable skinks as well as Nile Monitor. On site a lack of rocky habitat precludes several of the regionally occurring species.

During the brief site no reptile species were detected although numerous species certainly occur. Some of the more common reptiles likely to be encountered on site include the geckos; Common Tropical House Gecko Common Dwarf Gecko, Transvaal or Cape Gecko (similar), the lizards; Holub's Sandveld Lizard, Yellow-throated Plated Lizard, Speckled Rock and Variable skink, Common Flap-neck Chameleon and Southern Tree Agama, the non-venomous snakes; Southern African Python, Bibron's Blind Snake, Peters' Thread Snake (either one of the two potentially occurring subspecies), Black-headed Centipede-eater, Common House Snake, Short-snouted Grass Snake, Spotted Grass Snake (formerly Spotted Skaapsteker) and venomous snakes such as Puff Adder, Bibron's Stiletto Snake Rinkhals, Snouted Cobra Rhombic Egg-eater and Boomslang.

Two CI reptile species occur regionally but only one is highly likely to occur on site namely Southern African Python (**PS**). The other, Striped Skaapsteker (**NT**) is a rare species that may occur based on distribution but is highly dependent on termataria, a resource which was not particularly abundant on site. Additionally the site is likely to support six South African endemics namely Transvaal Gecko, Thin-tailed Legless Skink, Eastern Ground Agama, Aurora Snake, and South African Slug-eater and Striped Skaapsteker.

Table 7-10 Present and potentially occurring CI reptile species

FAMILY[1] & SPECIES[1]	COMMON NAME[1]	CONSERVATION STATUS			LoO 1,4	ATLAS (N) 1,4
		GLOBAL IUCN[3]	S.A. RED DATA[1]	S.A. NEM:BA[2]		
PYTHONIDAE (Python)						
Python natalensis	Southern African Python	2LC	LC	**PS**	2	-
LAMPROPHIIDAE (Advanced snakes)						
Homoroselaps dorsalis	Striped Harlequin Snake	1LC	**NT (End)**	-	3	-
	Key					
Status: 1 = Global; 2 = Regional; LC = Least Concern; PS = Protected Species; VU = Vulnerable						
Likelihood of Occurrence (LoO): 1 = Present; 2 = High; 3 = Moderate; 5 = May occur as a managed population						
Sources: [1]Bates *et al*. (2014); [2]ToPS List (2015); [3]IUCN (2015-4); [4]ReptileMap (2014)						

7.2.4 Frogs

Approximately 21 frog species may occur at a regional scale (**Appendix 5**). Of these, 10 species have been recorded during atlassing surveys in the QDS covering the study area of which Bubbling Kassina is the most frequently reported (FrogMap, 2016). Although the site itself

lacks any open water bodies, streams or appreciably inundated marshes, the presence of several small pans, dams and ephemeral river systems in the nearby vicinity may facilitate the presence of some 11 species on site. These include Bushveld Rain Frog, Eastern Olive Toad, Guttural Toad, Red Toad, Raucous Toad, Northern Pygmy Toad, Banded Rubber Frog, Boettger's Caco and Tremolo Sand Frog, Natal Sand Frog, Tandy's Sand Frog.

Bushveld Rain Frog, Eastern Olive Toad, Guttural Toad, Northern Pygmy Toad, Red Toad, Bubbling Kassina, Banded Rubber Frog, Snoring Puddle Frog, Plain Grass Frog, Broad-banded Grass Frog, Boettger's Caco, Queckett's River Frog, Giant Bullfrog, Tremolo Sand Frog, Natal Sand Frog and Tandy's Sand Frog.

Two CI frog species may occur regionally the **NT** Giant Bullfrog and **PS** African Bullfrog. Of the two Giant Bullfrog is the more likely species to occur as extensive field sampling and genetic analysis in the greater region has only yielded this species (C. A. Lotter *pers. comm.*). Although neither bullfrog species has been formerly recorded in the precise QDS covering the site (ReptileMap, 2016; Minter *et al*. 2004) the numerous scattered pans in the area provide ideal breeding habitat for Giant Bullfrog (C. Lotter pers. comm.). During fieldwork one of these small pan/dams was visited just outside the southern border of the site. A number of sand frog juveniles were observed there (*Tomopterna cryptotis*, and *T. tandyi* morphologically indistinguishable) but most importantly this depression appeared highly suitable for bullfrog breeding. Given the reported dispersal abilities of Giant Bullfrogs (Yetman and Ferguson, 2011) it is, at the very least, likely that bullfrogs utilise the site from a foraging and dispersal perspective, but also potentially for burrowing and aestivation (particularly females which have been known to occupy burrows more than 1 km from breeding sites). A number of factors suggest this. These include the proximity of the site to a highly suitable breeding site, the abundance of other pans in close proximity and the position of the site within a watercourse (along which bullfrogs tend to disperse). The farmer on site communicated that although he had seen bullfrogs in the area he had not yet encountered any on site. Despite this bullfrogs are often overlooked due to their brief surface activity patterns that take place during short window periods in the height of the rainy season and are not often encountered by day while foraging or dispersing away from breeding sites.

Table 7-11 Present and potentially occurring CI frog species

FAMILY [5] & SPECIES [5]	COMMON NAME [3]	CONSERVATION STATUS				
		GLOBAL IUCN [2]	S.A. RED DATA [3]	S.A. NEM:BA [1]	3,5	ATLAS (N) 3,5
PYXICEPHALIDAE (African common frogs)						
Pyxicephalus adspersus	Giant Bullfrog	LC (D)	**NT**	**PS**	2	5
Pyxicephalus edulis	African Bullfrog	LC (U)	LC	**PS**	4	1
Key						
Status: LC = Least Concern; NT = Near Threatened; PS = Protected Species						
Likelihood of Occurrence (LO): 1 = Present; 2 = High; 4 = Low						

Sources: [1]ToPS List (2007); [2]IUCN (2015-4); [3]Minter et al. (2004); [4]Du Preez & Carruthers (2009); [5]FrogMap (2015)

7.2.5 Terrestrial Macro-invertebrates.

Approximately 120 species of butterfly may occur based on distribution (Henning *et al*. 2009; Mecenero *et al*. 2013) and habitat (**Appendix 6**). To date 17 species have been confirmed in the QDS during atlas surveys (LepiMap, 2016). During the very brief site visit 15 species were detected of which 8 species represent new QDS records, bearing testament to the large proportion of butterfly species that are yet to be sampled in the QDS. Although no Red Data butterfly species occur in the region, one species the Marsh Sylph is listed as a **Rare / Low Density** species (Mecenero *et al*. 2013). This species, which was previously listed as **Vulnerable** (Henning *et al*. 2009) is unlikely to occur on site due to the lack of appreciably marshy habitat that support stands of *Leersia hexandra*.

The river systems and associated pools, pans and dams of the Kutswane and Tolwane rivers that straddle the study site to the east and west respectively probably account for the majority of the relatively high number of regionally occurring odonata species. On site however suitable habitat is scant and only a small subset of species that typically occupy areas away from waterbodies are likely to be encountered. Included in **Appendix 7** is a list of the 18 potentially occurring odonata species none of which are of conservation importance nor do any represent a high Dragonfly Biotic Index rating. only one species a female Kirby's Dropwing was detected on site.

Some eight scorpion species occur regionally. Of these six are considered likely to occur based on distribution and the availability of suitable habitat. These include the thick-tailed scorpion *Parabuthus mossambicensis*, the stinger scorpions *Uroplectes carinatus*, *U. vittatus* and *U. triangulifer* and the burrowing scorpions *Opistopthalmus pugnax* and *O. glabifrons*. The latter two were formerly recognised as **PS** under the old ToPS (2007) but have since been omitted from the ToPS (2015) lists.

In terms of megalomorph spiders a notable observation was that off an active burrow constructed by the *Calommata simony* or African Purseweb Spider (**Figure 7-7** and**Figure** 7-5). These spiders construct a silk lined near vertical burrow which is capped by a thin film of silk. This thin layer (often dusted with sand granules) is used to trap prey. The spider, which waits in a bell-shaped chamber below the silk lid, ambushes its prey by piercing the silk film and it's subsequently prey with one fang before drawing it back into the burrow. Remains are ejected the burrow. Females may live their entire lives within such a burrow Dippenaar-Schoeman (2002). Although not assigned a formal conservation status the species is noteworthy and methods are stipulated for sampling spiders of this group in the latest GDARD minimum requirements for biodiversity assessments. Four baboon spider species are listed for Gauteng Dippenaar-Schoeman (2002). Although *Harpactira* and *Pterinochilus* spp. were formerly recognised as Protected under the old ToPS (2007) they have since been removed from the ToPS (2015) lists. Nevertheless they are still listed in the provincial ordinance. Despite extensive searching no baboon spiders nor their burrows were detected on site although they are very likely present.

Table 7-12 Present and potentially occurring CI arachnid species

SPECIES & FAMILY[2,3]	COMMON NAME[2,3]	STATUS[1]	LO[2,3]
SCORPIONIDAE			
Opistopthalmus pugnax	Burrowing scorpions	**PS***	2
Opistopthalmus glabifrons	Burrowing scorpions	**PS***	3
THERAPHOSIDAE			
Harpactira hamiltoni	Golden Starbust Baboon Spider	**PS***	3
Pterinochilus junodi	Soutpansberg Starburst Baboon Spider	**PS***	3
	Key		
Status: NT = Near-threatened; PS = Protected Species; VU = Vulnerable			
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate; 4 = Low			
Sources: [1]ToPS (2007); [2]Leeming (2003); [3]Dippenaar-Schoeman (2002)			
*Old ToPS (2007) list status,ToPS (2015) no longer lists these species as Protected.			

7.3. Wetlands

The results of the wetland assessment are discussed in detail in the sections below. A fact sheet for the wetland system assessed is provided in **Section 7.3.6,** Table 7-13**.**

7.3.1 Wetland classification

A seep wetland was identified on the boundary of the site. Seeps are a wetland area located on gently to steeply sloping land and dominated by colluvial (i.e. gravity driven), unidirectional 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 temporary[7] 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 highlighted in the wetland fact sheets with the HGM unit shown in **Figure 7-8.**

The Atlas of Freshwater Ecosystem Priority Areas in South Africa (Nel *et al*, 2011a) identified 791 wetland ecosystem types in South Africa based on classification of surrounding vegetation (taken from Mucina and Rutherford, 2006) and hydro-geomorphic (HGM) wetland type; seven HGM wetland types are recognised and 133 wetland vegetation groups. The National Biodiversity Assessment 2011: Freshwater Component (Nel and Driver, 2012) then undertook an ecosystem threat status assessment for each of the 791 wetland ecosystem types where each wetland ecosystem type was assigned a threat status based on wetland type as well as on wetland vegetation group. The vegetation group, wetland ecosystem types and threat status for the wetland identified within the study site are highlighted in the wetland fact sheet.

[7] 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.

7.3.2 Wetland Extent

The extent 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 (**Figure 7-8**). The extent of the wetland within the study site was small, 0.8 ha, with the seep zone originating on site. The wetland on site was marked as the transitional zone between terrestrial habitat and wetland habitat, as the soil wetness indicators were identified at approximately 60 – 70 cm below the surface (the natural surface level had been disturbed due to ploughing), whilst the DWAF (2005) guidelines stipulate that the soil wetness indicators must be present in the top 50 cm (**Figure 7-9**). Vegetation indicators were absent on site, although the site has been disturbed due to agricultural activities. The wetland system on site does form part of a larger drainage feature in the region as highlighted in **Figure 7-10.**

7.3.3 Ecological State of Wetlands

The PES of the seep wetland and the current impacts have been summarised in the wetland fact sheet. Overall the wetland system scored C (Moderately Modified) –for the hydrology and geomorphology driver, and D/E – Largely/Seriously Modified for the vegetation driver. The main impacts include the farming of the wetland and upstream catchment and the associated removal of indigenous vegetation, furrows for drainage, irrigated fields, reduced surface roughness and increased surface run-off.

7.3.4 Ecological Importance and Sensitivity

In accordance with a recent study by the DWS (2014) on the PES, Ecological Importance (EI) and Ecological Sensitivity (ES) per Sub Quaternary Reaches for Secondary Catchments in South Africa, the Kutswane River (6 km downstream) scored a D (Largely Modified) for PES, a High for EI and a Moderate for ES.

The Ecological Importance and Sensitivity of the seep wetlands within the Site scored a Moderate, being ecologically important and sensitive on a local scale. Although the available habitat is limited on site due to the current disturbances, the wetland area immediately downstream of the site has not been farmed and provides habitat. The wetland could be used by the NT Giant Bullfrog for foraging purposes. Although not directly accounted for in the EIS methodology, the provision of clean water, slowly released to the downstream catchment, must not be overlooked as an ecologically important factor.

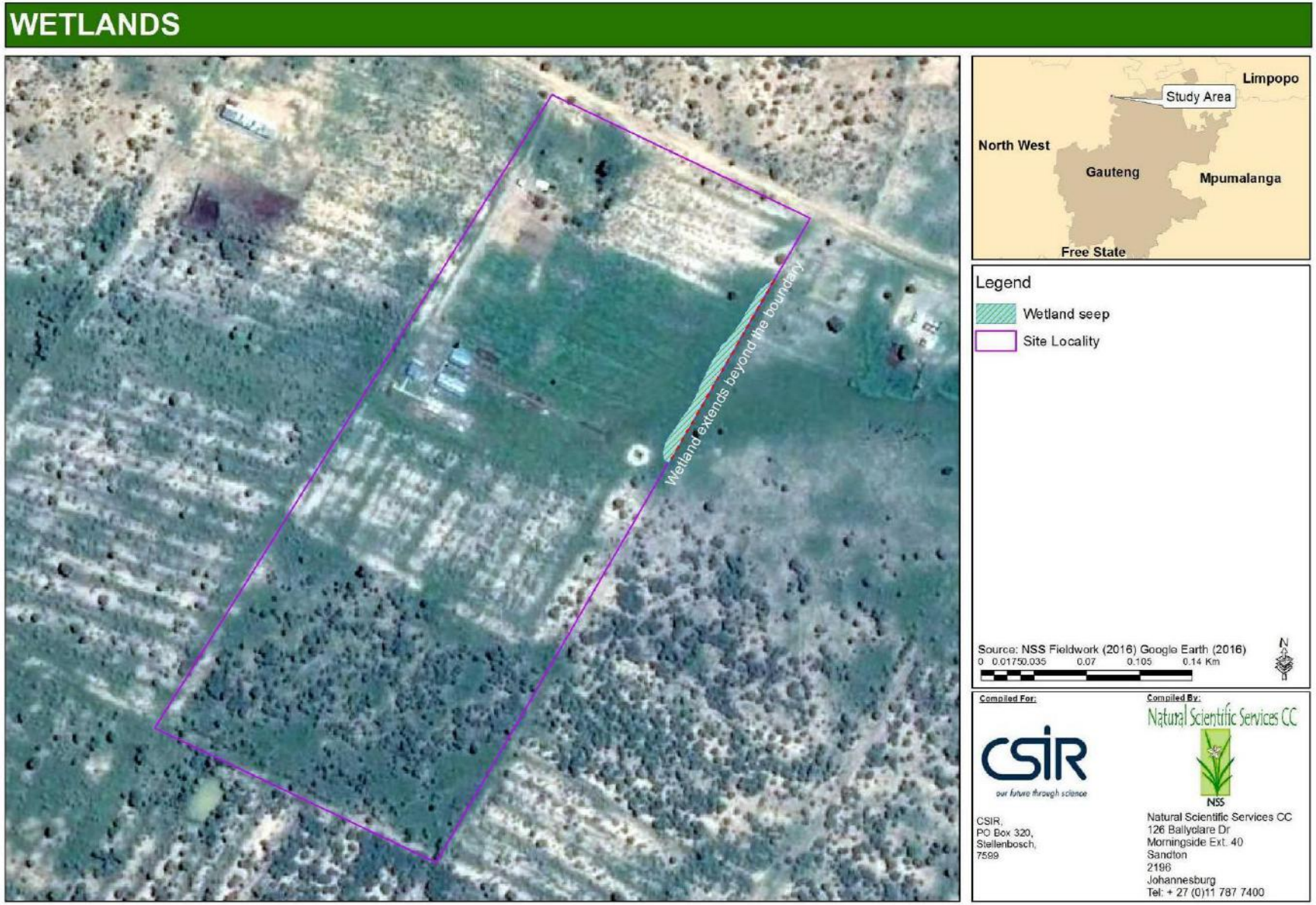


Figure 7-8 Seep Wetland

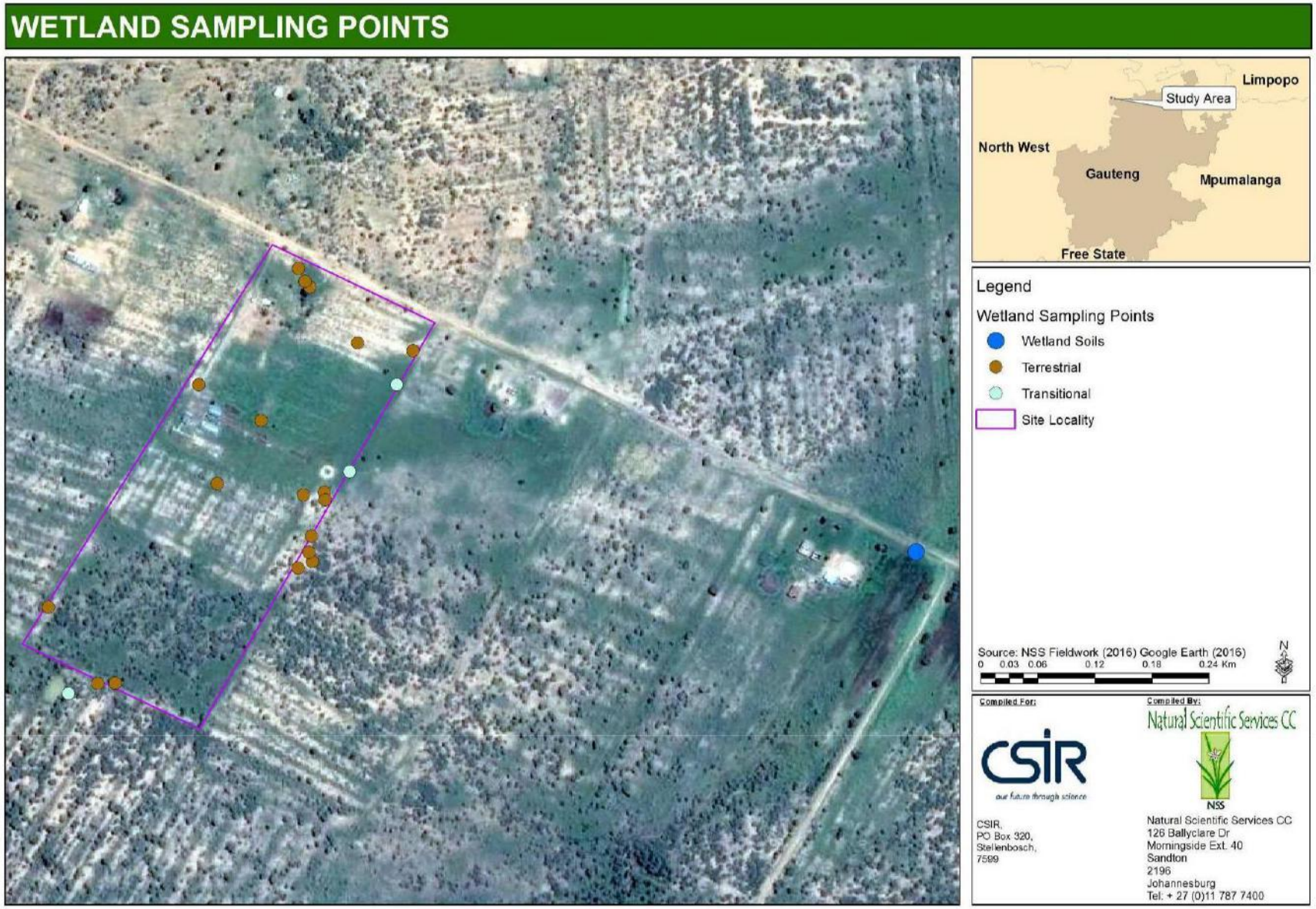


Figure 7-9 Wetland sampling points

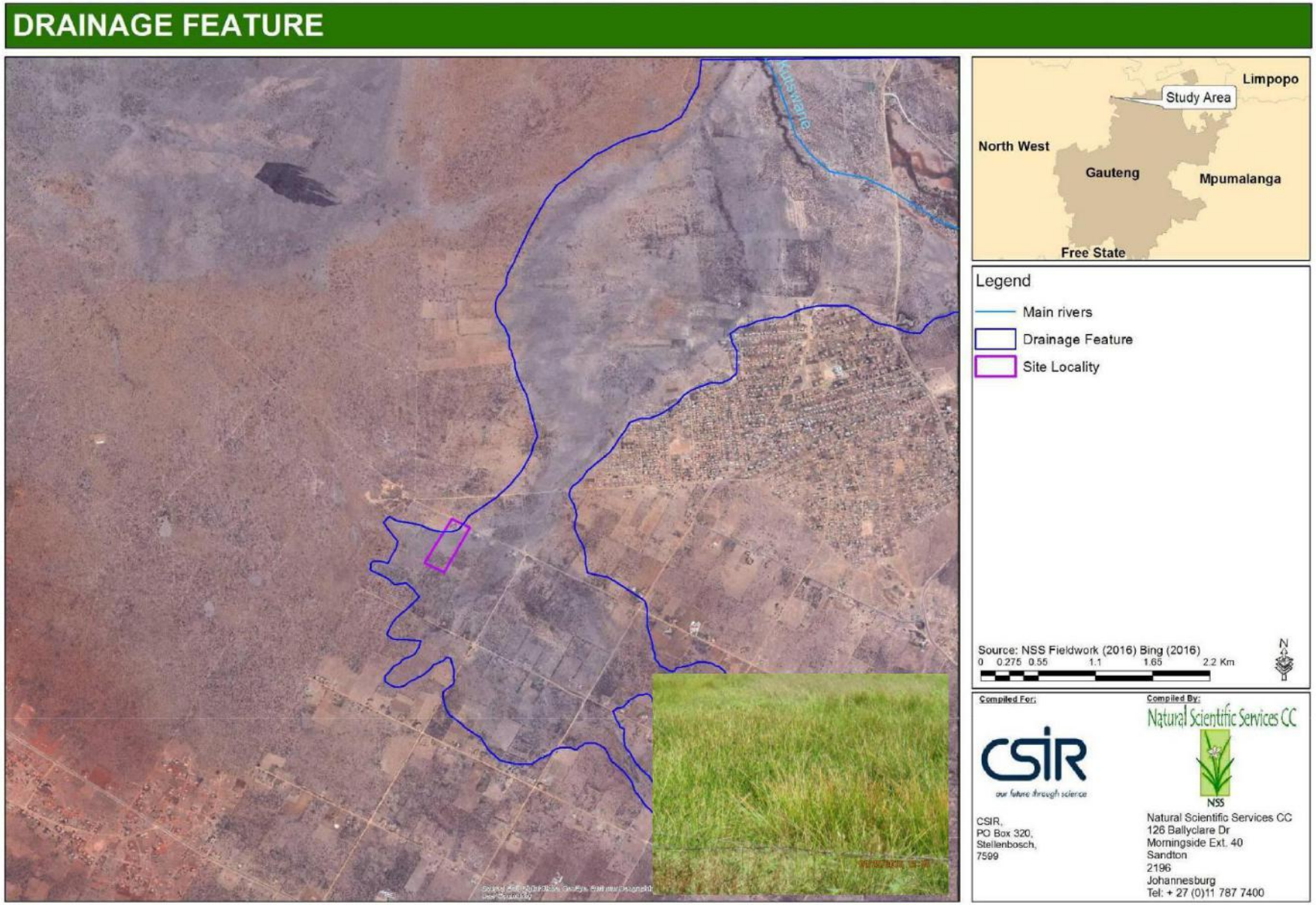


Figure 7-10 Drainage feature in the greater region

7.3.5 Wetland Eco-System Services

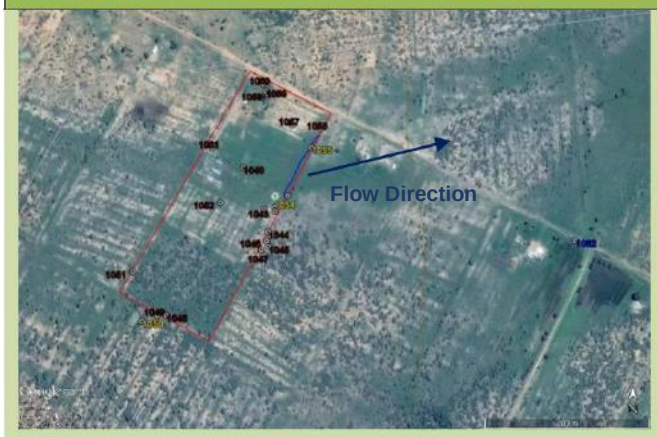
The ecosystem services supplied by the wetlands identified on site have been summarised in the fact sheet (**Table 7-13**). No ecosystem services scored a High rating for the likelihood of being supplied. The services that scored a Moderate-High included: sediment trapping; phosphate trapping; nitrate removal; provision of natural resources; provision of cultivated foods and stream flow regulation.

In general the seep wetlands are expected to contribute to some surface flow attenuation early in the season (until soils are saturated). This 'plugging' effect increases the storage capacity of the slope above the wetland, and prolongs the contribution of water to the downstream wetland systems during low flow periods. Seepage wetlands generally supply a number of water quality enhancement benefits, e.g.: removal of excess nutrients and organic pollutants, removal of nitrogen, etc. The opportunity to supply a number of these benfits scored a High due to the existing piggery an agricultural activities within the catchment.

7.3.6 Wetland Fact Sheets

The findings associated with the seep wetland identified on site are summarised in the below fact sheet.

Table 7-13 Seep Wetland - Fact Sheet

<table>
<tr><th colspan="4">Legae la Thlago Seep</th></tr>
<tr><td colspan="2">Wetland Area (within Study Site)</td><td colspan="2">0.08 ha</td></tr>
<tr><td colspan="2"> 
</td><td colspan="2">  </td></tr>
<tr><th colspan="4">LEVEL 1 TO 4 CLASSIFICATION (Ollis et al, 2013)</th></tr>
<tr><td>Level 1: System</td><td>Inland</td><td>Level 3: Landscape Unit</td><td>Slope</td></tr>
<tr><td>Level 2: Ecoregion
Level 2: NFEPA – WetVeg (WVG) and Threat Status</td><td>8.05 (Bushveld Basin)
Central Bushveld Group 2 (Vulnerable)</td><td>Level 4: Wetland HGM Type (WT) and Ecological Threat Status</td><td>Seep – Least Threatened (An ecosystem type had to have > 60% of its total extent in a good
OR moderately-modified (A, B or C ecological category))</td></tr>
<tr><th colspan="4">CONSERVATION STATUS</th></tr>
<tr><td rowspan="2">Protection Level WT</td><td rowspan="2">Poorly Protected (at least 5% of their target in protected areas and in good condition)</td><td>FEPA</td><td>FEPA wetlands approximately 6km downstream associated with Kutswane River</td></tr>
<tr><td>GDARD C-Plan</td><td>No rating</td></tr>
<tr><th colspan="4">SETTING</th></tr>
</table>

<table>
<tr><th colspan="4">Legae la Thlago Seep</th></tr>
<tr><td>Quaternary catchment</td><td>A23J</td><td rowspan="2">Hydrology</td><td rowspan="2">Seeps are usually fed by both surface and sub-surface water, with sub-surface having a larger contribution.</td></tr>
<tr><td>Slope</td><td>~ 1 %</td></tr>
<tr><td>Geology
(Mucina & Rutherford, 2006; AGIS, 2014)</td><td>Karoo Supergroup. Most abundant in the area are the mafic volcanic (tholeitic and olivie basalts and nephelinites) of the Letaba Formation, then the mudstones of the Irrigasie Formation and the shale, with sandstone units, of the Ecca Group</td><td>Soils
(Mucina & Rutherford, 2006; AGIS, 2014)</td><td>Vertic soils. The vertic soils, with a fluctuating water table, experience prolonged periods of swelling and shrinking during wet and dry periods, considerable soil cracking when dry, a loose soil surface, high calcium carbonate content and gilgai micro-relief</td></tr>
<tr><td colspan="2">NSS Rating
Hydrology – C Moderately Modified
Geomorphology – C Moderately Modified
Vegetation – D/E Largely to Seriously Modified

DWS (2014) rating for the Kutswane River – Largely Modified (Category D)</td><td colspan="2">NSS Rating –Moderate EIS

DWS (2014) Rating for the Kutswane River (6km downstream) – High EI & Moderate ES</td></tr>
<tr><td colspan="4">MAIN ECOSYSTEM FUNCTIONS</td></tr>
<tr><td colspan="2"></td><td colspan="2">No ecosystem services scored a High likelihood of being supplied.
The Following ecosystem services scored a Moderately High likelihood of being supplied:
o Sediment trapping
o Phosphate trapping
o Nitrate removal
o Provision of natural resources
o Provision of cultivated foods
o Streamflow regulation</td></tr>
<tr><td colspan="4">WETLAND INDICATORS</td></tr>
<tr><td colspan="4"> 
Hydric indicators GPS 1054 (hydric indicators present from 70 cm – transitional zone)</td></tr>
<tr><td colspan="4">CURRENT IMPACTS</td></tr>
<tr><td colspan="4">Current Impacts:
• Seep catchment covered by agricultural fields
• Fields ploughed, resulting in ~60 cm deep furrows
• Fields irrigated</td></tr>
</table>

Legae la Thlago Seep

- Effluent Dam and channel situated within seep transitional zone
- Evidence of sheet erosion due to the fallow fields and sparse grass cover in the catchment
- Grassland, immediately adjacent to the ploughed field, is disturbed and dominated by pioneer species (**Section 7.1**).

Cultivated fields – irrigation pipeline and furrows

Disturbed grassland dominated by pioneer species

Effluent dam and channel within seep transitional zone

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

On an International level the site does not fall into any:

- *Ramsar Sites*
- *World Heritage Sites*
- *Important Bird Areas (IBAs)*

8.2. National and Regional Areas of Conservation Significance

As inferred in the preceding legislation section of this report, a number of biodiversity features in the region, which are of recognized 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 Bushveld Bankenveld Priority Area (**Figure 8-2**).

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 Study Site is situated in the **Vulnerable (VU)** *Springbokvlakte Thornveld* as indicated in **Figure 8-2**. *This* unit under the Threatened Ecosystems is categorised as *A1: Remaining natural habitats < 60% of original area of ecosystem*.

8.2.2 National Water Act

A broad spectrum of international, regional and national legislation and guidelines applies to the protection of rivers and their biodiversity. The National Water Act (NWA; Act 36 of 1998) is the principle legal instrument relating to water resource management in South Africa. Under the NWA, all rivers, wetlands and their buffer zones are protected.

The NWA points out that it is:

> "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."

According to Chapter 3 of the NWA on the 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."*

8.2.3 Freshwater Ecosystem Priority Areas

South African National Biodiversity Institute (SANBI), in collaboration with 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). According to Freshwater Ecosystem Priority Areas (FEPAs) for the country, the Kutswane River north of the proposed development is a **Wetland FEPA** as indicated in **Figure 8-1** (Driver *et al*. 2011). In summary of the National Guideline document, Driver *et al.* (2011) state the following objectives for a Wetland FEPA:

- Wetland FEPAs were identified using ranks that were based on a combination of special features and modelled wetland condition. Special features included expert knowledge on features of conservation importance (e.g. extensive intact peat wetlands, presence of rare plants and animals) as well as available spatial data on the occurrence of threatened frogs and wetland-dependent birds.
- Wetland FEPAs currently in a good ecological condition should be managed to maintain this condition. Those currently not in a good condition should be rehabilitated to the best attainable ecological condition.

8.2.4 National Threat Status

The National Biodiversity Assessment 2011: Freshwater Component (Nel & Driver, 2012) undertook an assessment on the ecosystem threat status and ecosystem protection levels for each river and wetland ecosystem type. The perennial Lower Foothill within the Highveld Eco-Region, such as the Kutswane River, is classified as **Critically Endangered (CR)** and not protected. Seep wetlands within the Central Bushveld Group 4 are classified as **Least Threatened**[8] and are poorly protected[9] (Driver *et al.* 2011; Nel & Driver, 2012).

8.2.5 Ecological Importance & Sensitivity (EI&S)

The Kutswane River and forms part of the Crocodile (West) & Marico WMA 3 and has a high ecological importance and sensitivity (EI&S) as this sub-quaternary catchment is dominated by the *SVcb 15 Springbokvlakte Thornveld* that is considered an Endangered vegetation unit and a Gazetted Vulnerable Threatened Ecosystem. Fifty one species, three wetland and nine riparian habitat types, 15 different vegetation cover types, two protected and two endemic species occur in this sub-quaternary. In addition, the riparian, wetland and instream vertebrates (excluding fish) from the Kutswane River have a high sensitivity to modified flow conditions and water level changes (DWS, 2014).

In terms of fish species, according to the IUCN (2014), the CI fish species *Oreochromis mossambicus* (Mozambique tilapia) is **Near Threatened (NT)**. This species is threatened by

[8] Least Threatened (An ecosystem type had to have > 60% of its total extent in a good OR moderately-modified (A, B or C ecological category))
[9] Poorly Protected (at least 5% of their target in protected areas and in good condition)

hybridisation with the rapidly spreading *Oreochromis niloticus* (Nile Tilapia). *Oreochromis niloticus* is being spread by anglers and for aquaculture purposes. Hybridisation is already occurring throughout the northern part of the species' range with most of the evidence coming from the Limpopo River system. Threats associated with the *O. niloticus* locations have been documented in ca 50% of all known *O. mossambicus* localities. However, given the rapid spread of *O. niloticus* it is anticipated that *O. mossambicus* will qualify as threatened under Criterion A due to rapid population decline (Cambray & Swartz, 2007). Although no habitat present on site or immediately downstream, *O. mossambicus* occurs in slow flowing waters but thrives in standing waters. In addition, *O. mossambicus* prefers a high water column and warmer temperatures (22°-42°C). This species tolerates fresh, brackish or marine waters and higher salinity concentrations (Cambray & Swartz, 2007; Kleynhans *et al*. 2008; Skelton, 2001).

8.2.6 GDARD – Conservation Plan

The study site does not form part of Gauteng's C-Plan and according to the latest C-Plan, the study site has not been identified as a protected area as seen in **Figure 8-3**.

8.3. Local Areas of Conservation Significance

A map was compiled based on the above and the ecological scan undertaken by NSS to depict local Areas of Significance for the conservation of terrestrial flora and fauna (**Figure 8-4**). Areas of significance include areas that have been highlighted because of their:

- 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

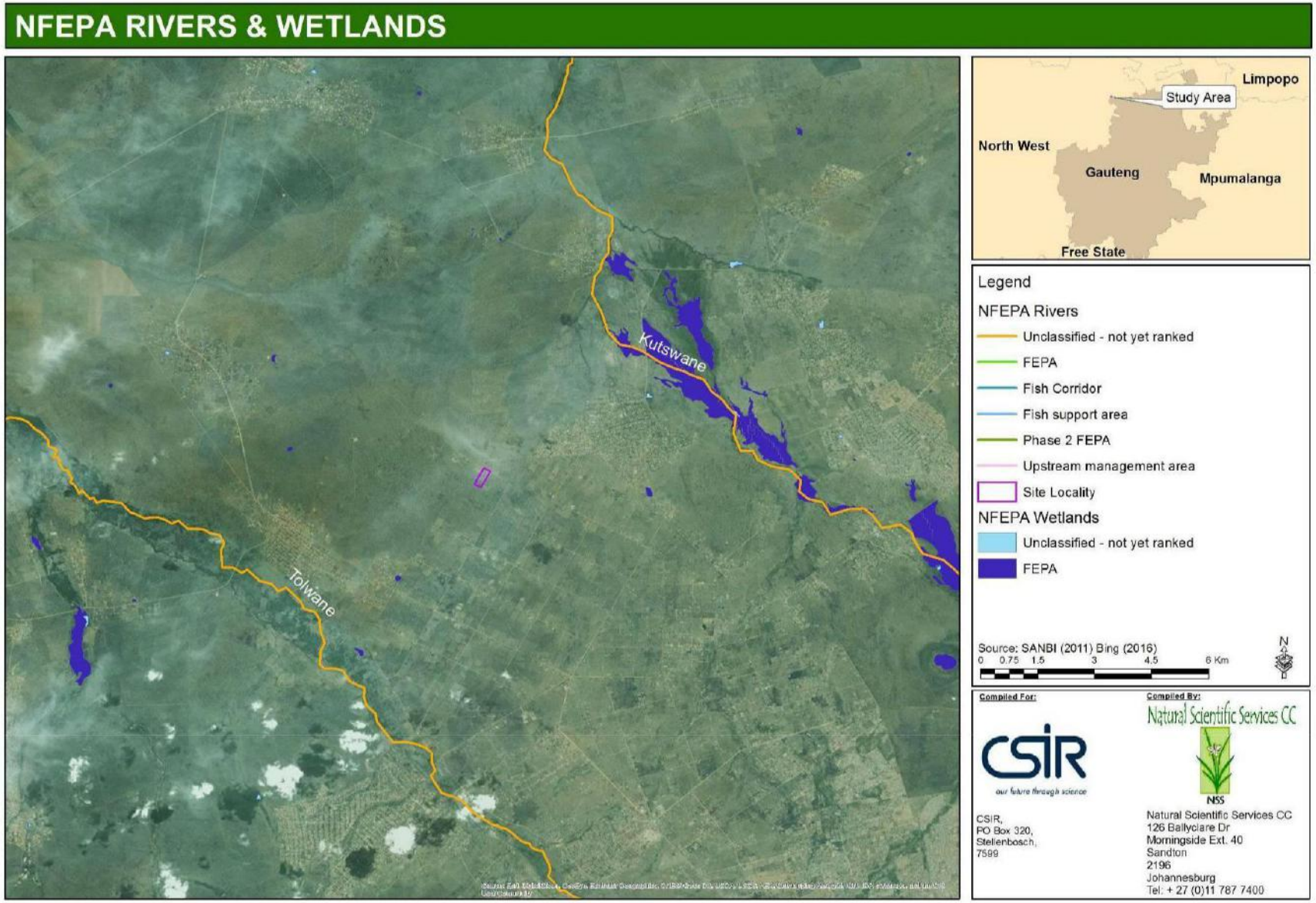


Figure 8-1 Freshwater Ecosystem Priority Areas

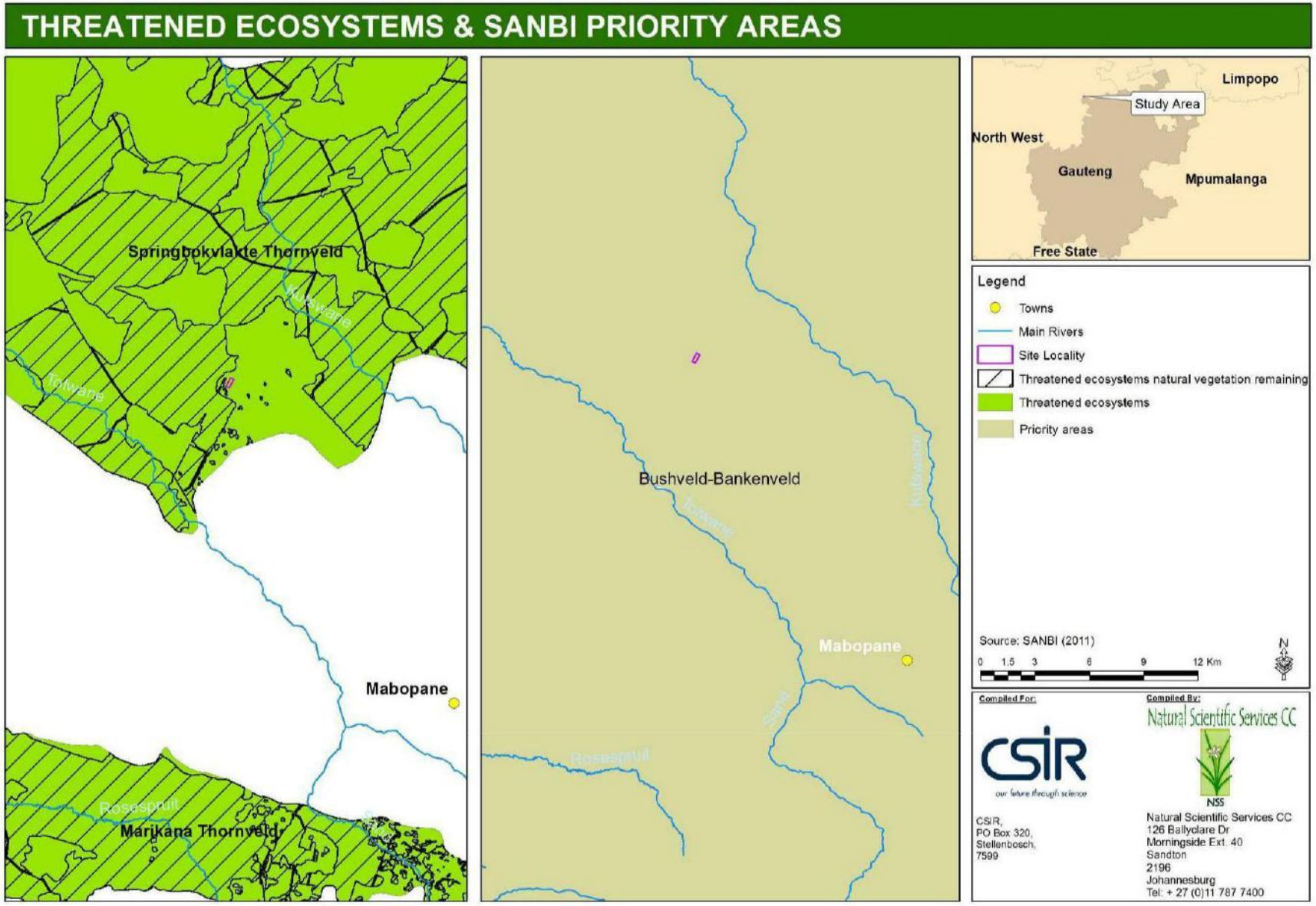


Figure 8-2 Threatened Ecosystem and SANBI Priority Areas

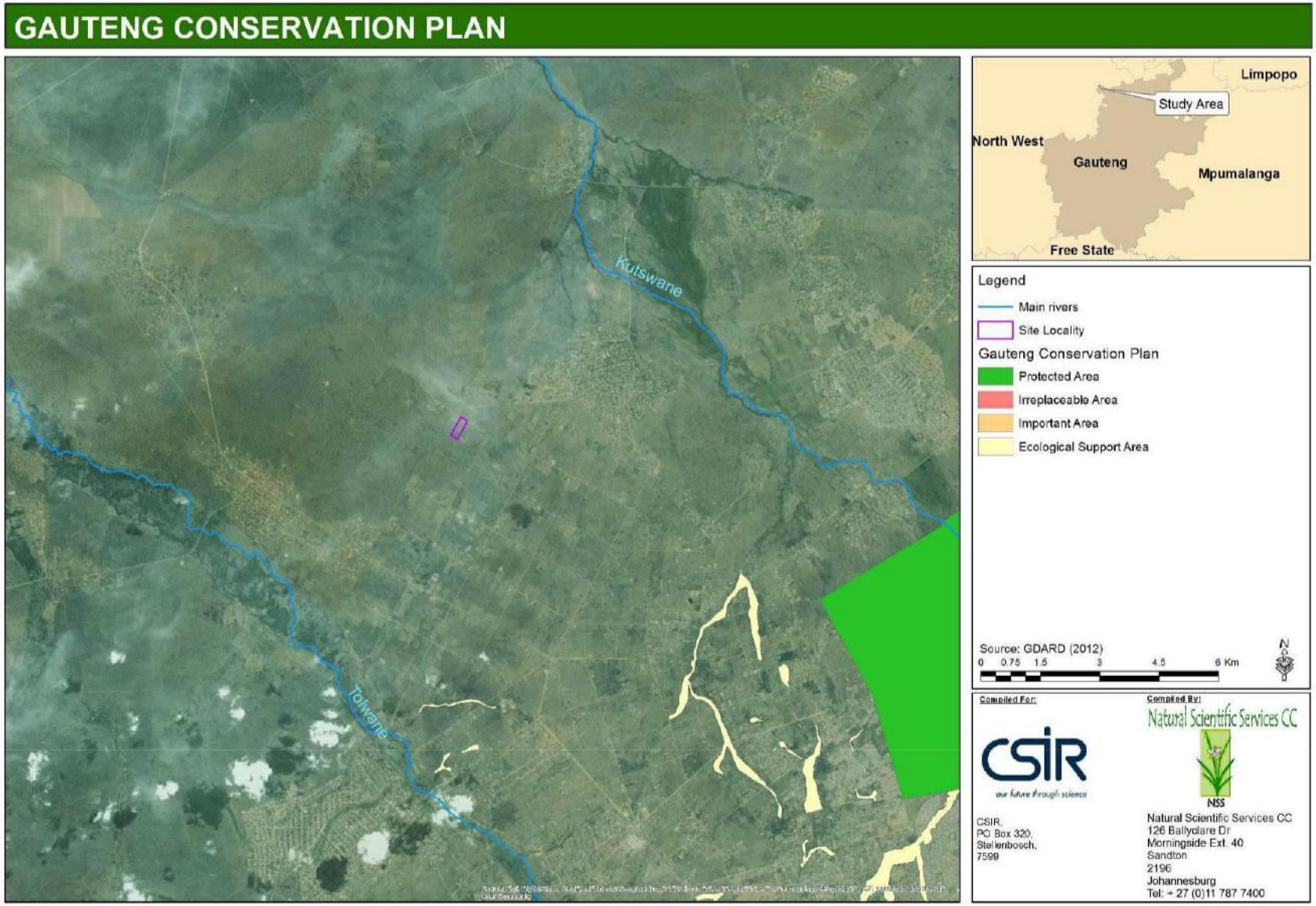


Figure 8-3 Gauteng Conservation Plan Version 3

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					
Open *Acacia* Sandy Bushveld	Moderate - High (4)	Situated in: ▪ A SANBI Priority Zone ▪ the Vulnerable Threatened Ecosystem ▪ Endangered Springbokvlakte Vegetation Unit Highest Species Richness of all the units and contains a Protected species under the Gauteng Ordinance. Unit is approximately 2.4% of the Study Site and over 24% falls within expansion area (4)	Protected Species (3)	▪ Limited Alien Invasives but limited herbaceous cover as well, thereby increase in splash erosion ▪ Surrounding pressures from cattle grazing and crop farming (-1)	**Moderate-High (10)**
Acacia Woodland (including Mixed Bushclumps)	Moderate (3)	Situated in: ▪ A SANBI Priority Zone ▪ the Vulnerable Threatened Ecosystem ▪ Endangered Springbokvlakte Vegetation Unit Second highest Species Richness of all the units and contains a Protected Tree species under the Forest Act. ▪ Unit is approximately 34.4% of the Study Site (3)	Protected Tree Species; Conservation noteworthy Trapdoor spider species (3)	▪ Alien Invasives in the form of *Opuntia* and *Cereus* These are Category 1 species. *Nerium oleander* found within the bushclump to the north ▪ Surrounding pressures from cattle grazing and crop farming (-2)	**Moderate (7)**
Wetland System					
Wetland System (**Figure 7-8**)	High (5)	Situated in: ▪ A SANBI Priority Zone ▪ the Vulnerable Threatened Ecosystem ▪ Endangered Springbokvlakte Vegetation Unit Protected under National Water Act	Possible Utilisation by species such as Giant Bullfrog (3)	▪ Seep catchment covered by agricultural fields ▪ Fields ploughed, resulting in ~60 cm deep furrows ▪ Fields irrigated ▪ Effluent Dam and channel situated within seep transitional zone	**High (11.5)**

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
		(NWA; Act 36 of 1998) (5)		▪ Evidence of sheet erosion due to the fallow fields and sparse grass cover in the catchment. (-1.5)	
Transformed (Habitat In Recovery)					
Acacia Woodland in recovery (Previous Crop Areas)	Medium-Low (2)	Situated in: ▪ A SANBI Priority Zone ▪ the Vulnerable Threatened Ecosystem ▪ Endangered Springbokvlakte Vegetation Unit Limited Species richness and diversity Still within recovery – not yet a climax system (2)	Unlikely (1)	▪ Some Alien and Invasives present ▪ Susceptible to further alien invasions ▪ Dumping and edge effects from surrounding old fields and the piggery (-2)	**Moderate-Low (3)**
Transformed					
Alien Bushclumps; Built-up Areas; Crop areas	Low (1)	Limited Species diversity and Conservation Value (1)	Unlikely (1)	Highly transformed (-4)	**Low (-1)**

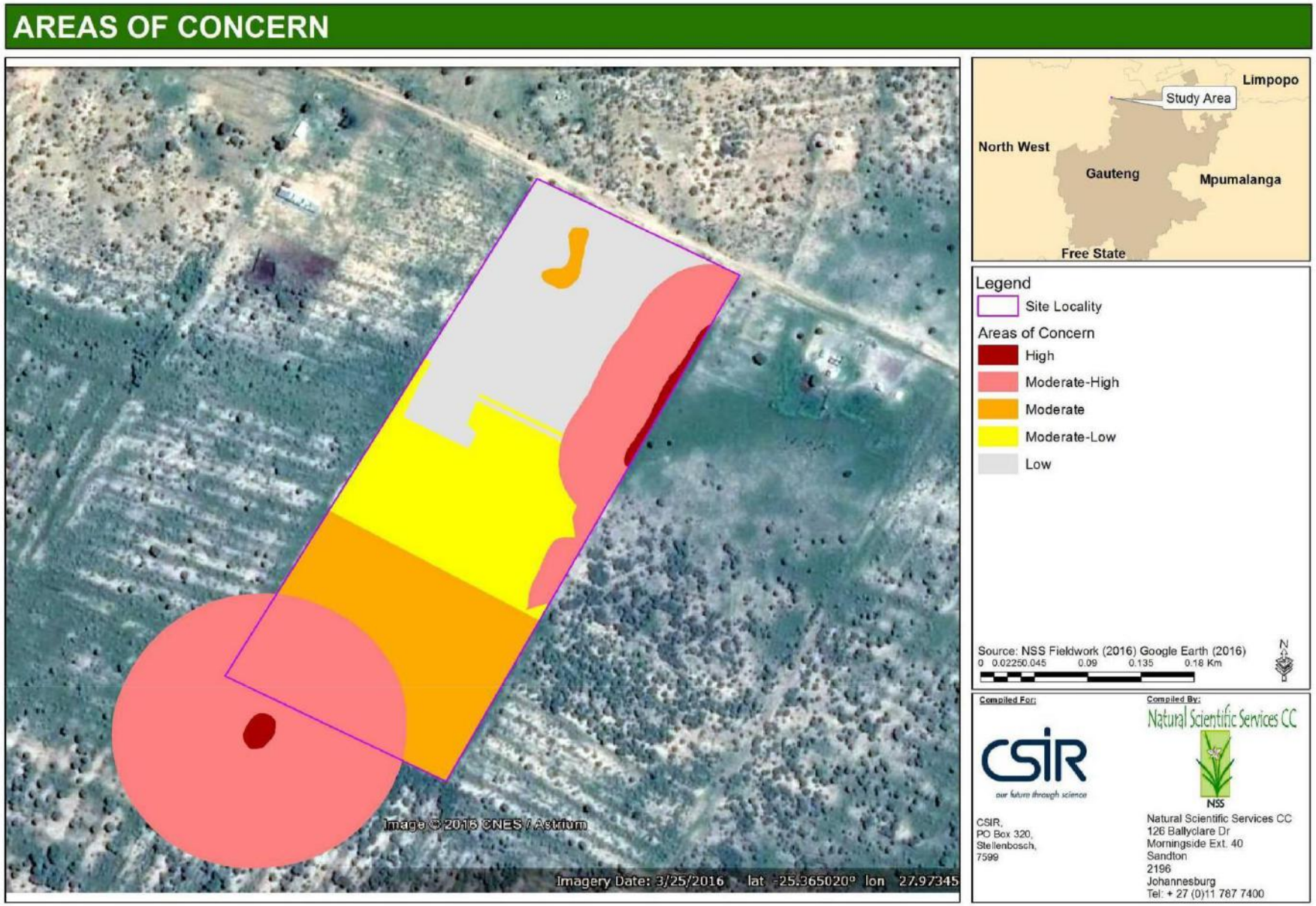


Figure 8-4 Local Areas of Conservation Significance

9. Impacts 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. Construction & Operation

9.1.1 Direct loss of terrestrial vegetation and faunal habitat

The majority of the site, earmarked for the expansion of the piggery, has been transformed and very little natural vegetation remains. It is not expected that expansion activities will impact natural fauna and flora, in this regard, to any appreciable level. The expansion area as highlighted in **Figure 5-1**, will affect the following Vegetation Communities:

- *Acacia* Woodland in recovery (Previous Crop Areas)
- Open *Acacia* Sandy Bushveld

30% of the *Acacia* Woodland in recovery community and 24% of the Open *Acacia* Sandy Bushveld will be affected.

9.1.2 Loss / Reduction of CI or medicinal flora

Further site clearing may affect the Protected stapeliads (*Duvalia*) and Marulas (*Sclerocarya*) (Protected Tree species) on site. Although this is considered to be of low significance as the *Sandy Acacia Woodland* habitat covers only a small area to the east of the Study Site (more habitat is found off site to the east and south eastern sections).

9.1.3 Introduction & proliferation of alien species leading to increased competition and change in habitat structure

During construction the increase in alien vegetation is likely to occur following an increase in vehicles, people and materials, as well as any site disturbance, especially in the absence of any control measures. This could lead to further competition and ultimately vegetation structural changes within the different units. As the *Acacia woodland Recovery* unit is not in a climax stable state, this unit may be more significantly impacted on.

9.1.4 Direct loss of wetlands and deterioration of downstream wetland drivers

A seep wetland originates on the site boundary. The wetland indicators found on site suggest the wetland is transitional (between terrestrial and wetland habitat). The expansion of the piggery will result in the direct loss of 0.08 ha of transitional seep wetland habitat. The loss of the wetland will also impact on the downstream wetland drivers, by increasing hardened surfaces, further reducing surface roughness, increasing the sediment load etc.

The site is 6km upstream of the Kutswane River, so the likelihood of impacts reaching the system are considered to be low due to the presence of seep wetlands prior to the channelled valley bottom wetlands of the tributary of the Kutswane River.

9.1.5 Faunal Mortality and Displacement (including CI species)

Although a number of CI fauna may occur, the only species of any potential concern in this regard is Giant Bullfrog. The proximity of the site to a highly suitable breeding site (just outside the southern boundary), the abundance of other pans in close proximity and the position of the site within a drainage feature (along which bullfrogs tend to disperse) means that the chance of unearthing aestivating bullfrogs or running them over during excavation and site levelling cannot be ruled out. Although the farmer on site mentions that none have been seen, they can be easily overlooked.

9.1.6 Increase in dust and erosion degrading habitat integrity

Earth-moving activities for the expansion of the piggery, clearing/preparation of land for the orchard (in the north eastern corner) and the continued tilling of land inbetween is likely to increase bare ground, dust and the land's susceptibility to erosion. Although of low intensity given the predominantly turf substrate, this impact should not be underplayed given the site's position within a drainage feature.

9.1.7 Sensory disturbances

Sensory disturbance of fauna from noise, dust and light pollution during construction will cause many fauna to vacate the site, at least temporarily. Animals that would be most adversely affected include calling species (such as potentially occurring CI Secretarybird), and secretive and or nocturnal species (such as bats, hedgehogs and bullfrog).

9.2. Specific Operational Impacts

9.2.1 Deterioration of Water Quality and impact on downstream aquatic ecology

Currently an open gutter conveys pig effluent away from the piggery towards (but not yet linking to) an open concrete pit. As such pig effluent is being discharged directly into the receiving environment. This is a major potential impact that will need to be addressed accordingly given the sites position within a drainage feature that feeds the Kutswane River. Various contaminants are present in pig effluents including nutrients, pathogens, veterinary pharmaceuticals (including, inter alia, antibiotics) and naturally excreted hormones. A piggery can also cause elevated EC, TDS and salinity concentrations due to the increased of the ions and salts, namely calcium (Ca^{2+}), magnesium, sodium, nitrate and chloride (Cl^{-}). Inappropriate slurry management and improper disposal of carcasses as well as excess fodder and chemicals (herbicides and pesticides) or fertilizers used for vegetable or fruit production or any other operational waste could cause a deterioration of the downstream water quality.

As mentioned in **Section 6.3 one of the main ecosystem services provided by the seep wetlands is water quality enhancement. However, should the piggery effluent impact on the unchannelled valley bottom wetlands and the further downstream Kutswane River, the impacts that may be experienced are highlighted in Appendix 12.9.**

9.2.2 Poor / Inappropriate control of invertebrate pests

Substandard animal husbandry / hygiene and waste generation in the form of pig effluent, excess fodder and fertiliser has the potential, if improperly managed, to facilitate aggregation and/or breeding of invertebrate pests such as flies, weevils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc.

9.2.3 Poor / Inappropriate control of vertebrate pests

As above, poor waste management and pig hygiene practices has the potential to attract vertebrate pests including rodents (Black Rat, House Mouse), carnivores (Black-backed Jackal, dogs, cats) and birds (Common Myna, Pied Crow, Sacred Ibis, Cattle Egret and Black-headed Heron). Furthermore, proliferation of pest alien animals could adversely affect indigenous fauna through competition, predation and disease transmission.

9.2.4 Transmission of diseases

The current open gutter system on site for conveying pig effluent is problematic in this regard. Fauna particularly birds are able to feed directly on this and indeed several Sacred Ibises and Cattle Egrets were observed doing just that. This open trenching setup (if continued into operation) is not advised as diseases could be transmitted either directly from pigs and their effluent, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of fauna in the surrounding area. If carcasses are to be burned/disposed of on site (strictly ill-advised) the potential for disease transmission would increase.

9.2.5 Reduction in CI Species - Harvesting of CI or medicinal flora

During Operations, CI species such as the stapeliads may be reduced due to harvesting by those entering the site and the surrounds. The probability, however, is considered to be low.

9.2.6 Increased burning - degrading habitat integrity/ Destruction of Species

The incidence of wild fires on site and in the area could increase or decrease to the possible detriment of native flora and fauna. Although fires might result unintentionally with carcass or fire-break burning, for example, it is more likely that burning will be prohibited as far as possible for human and infrastructural safety. If to frequent fires could adversely affect potentially occurring CI species such as hedgehogs, bullfrogs or large terrestrial birds (e.g. Secretarybird).

9.2.7 Introduction & proliferation of alien spp. - Competition and change in structure

During Operation an increase in invasive alien species could occur from seeds in excess fodder, pig effluent as well as from influx of vehicles etc, and lack of alien species control.

9.2.8 Sensory disturbances

Sensory Disturbances to fauna on site may be caused by noise from the pigs and vehicles, light pollution (certain bat species and other nocturnal fauna) and general effluent / waste .

These may affect behavioural patterns and interfere with important life history patterns such as breeding, lekking etc. It is likely that medium to large mammals particularly carnivores as well as large terrestrial birds will be the most adversely affected. Although a certain spectrum of common and generally commensal species may be tolerant of (Hadeda, House, Grey-headed and Cape Sparrows) or even attracted to such disturbances (E.g. Cape Serotine and Egyptian Free-tailed Bats)

9.3. Decommissioning Phase

Two main impacts could occur within the Decommissioning phase. These are highlighted below:

9.3.1 Introduction & proliferation of alien spp. - Competition and change in structure

If no rehabilitation and monitoring efforts are implemented, alien species could continue to increase and spread specifically around the croplands, within the pioneer recovery fields and around the piggery and houses.

9.3.2 Sensory disturbances

Continued disturbances to fauna could occur during the Decommissioning Phase due to vehicle and human activity, noise and dust. These are considered to be short term and reversible.

9.4. Management and Mitigatory Recommendations

Management and Mitigatory Recommendations are highlighted **Table 10-2** below. With Mitigation measures implemented, the significance of most impacts on site from an ecological perspective are reduced to a **Low Significance** as highlighted in below.

Table 9-1 A Summary of Impacts and Significance with Mitigation

POTENTIAL IMPACTS	SIGNIFICANCE RATING	SIGNIFICANCE RATING
CONSTRUCTION	**With**	**Without**
Direct loss of terrestrial vegetation and faunal habitat	**Low**	**Low**
Loss of CI or medicinal flora	**Low**	**Low**
Introduction & proliferation of alien spp.	**High**	**Low**
Direct loss of wetlands and deterioration of downstream wetland drivers	**High**	**Low**
Faunal Mortality and Displacement (including CI species)	**Medium**	**Low**
Increase in dust and erosion degrading habitat integrity	**Medium**	**Low**
Sensory disturbances	**Low**	**Low**
OPERATION		
Deterioration of Water Quality and impact on downstream aquatic ecology	**High**	**Low**
Poor / Inappropriate control of invertebrate pests	**High**	**Low**
Poor / Inappropriate control of vertebrate pests	**Medium**	**Low**

POTENTIAL IMPACTS	SIGNIFICANCE RATING	SIGNIFICANCE RATING
Transmission of diseases	**High**	**Low**
Reduction in CI Species - Harvesting of CI or medicinal flora	**Low**	**Low**
Increased burning - degrading habitat integrity/ Destruction of Species	**Medium**	**Low**
Introduction & proliferation of alien spp. - Competition and change in structure	**High**	**Low**
Sensory disturbances	**Medium**	**Low**
DECOMMISSIONING		
Introduction & proliferation of alien spp. - Competition and change in structure	**High**	**Low**
Sensory disturbances	**Low**	**Low**

10. Concluding Remarks

With the implementation of the mitigation measures suggested in this report, the significance of most impacts on site from an ecological perspective are considered to be of **Low Significance**. Based on the information available to date, with the brief field scan of the site, it is NSS's opinion that there are no fatal flaws to the project and that provided the mitigation set out is adhered to NSS have no objections to the project going forward. This includes moving out of the wetland and associated buffer as well as not encroaching the *Open Acacia Sandy Bushveld* area.

Table 10-1 Impact Assessment

POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT		DURATION		INTENSITY		REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	PROBABILITY	SIGNIFICANCE		CONFIDENCE	
			RATING	S	RATING	S	RATING	S	RATING	RATING	RATING	SCORE	RATING	S	RATING	S
CONSTRUCTION																
Direct loss of terrestrial vegetation and faunal habitat																
The majority of the site, earmarked for the expansion of the piggery, has been transformed and very little natural vegetation remains. It is not expected that expansion activities will impact natural fauna and flora, in this regard, to any appreciable level	Without	Negative	Site specific	1	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Moderate irreplaceability	Probable (25-50% chance)	0.5	**Low**	**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
Loss of CI or medicinal flora																
Further site clearing may affect the **Protected** stapeliads and Marulas (Protected Tree species) on site. Although this is considered to be of low significance	Without	Negative	Site specific	1	Long term (>15 years)	4	Medium-low	2	Moderate reversibility	Moderate irreplaceability	Low probability (10-25% chance)	0.25	**Low**	**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
Introduction & proliferation of alien plant spp.																
During construction the increase in alien vegetation is likely to occur following an increase in vehicles, people and materials, as well as any site disturbance, especially 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
Direct loss of wetlands and deterioration of downstream wetland drivers																
A seep wetland originates on the site boundary. The wetland indicators found on site suggest the wetland is transitional (between terrestrial and wetland habitat). The expansion of the piggery will result in the direct loss of 0.08 ha of transitional seep wetland habitat. The loss of the wetland will also impact on the downstream wetland drivers, by increasing hardened surfaces, further reducing surface roughness, increasing the sediment load etc.	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
Faunal Mortality and Displacement (including CI species)																
Although a number of CI fauna may occur the only species of any potential concern in this regard is Giant Bullfrog. The proximity of the site to a highly suitable breeding site (just outside southern boundary), the abundance of other pans in close proximity and the position of the site within a drainage feature (along which bullfrogs tend to disperse) means that the chance of unearthing aestivating bullfrogs or running them over during excavation and site levelling cannot be ruled out. Although the farmer on site mentions that none have been seen, they are easily overlooked.	Without	Negative	Local (<2km from site)	2	Short term (2-5 years)	2	Medium	4	Irreversible	Moderate 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	Moderate irreplaceability	Low probability (10-25% chance)	0.25	**Low**	**1**	Medium	2
Increase in dust and erosion degrading habitat integrity																

POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT		DURATION		INTENSITY		REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	PROBABILITY	SIGNIFICANCE		CONFIDENCE	
			RATING	S	RATING	S	RATING	S	RATING	RATING	RATING	SCORE	RATING	S	RATING	S
Earth-moving activities for the expansion of the piggery, clearing/preparation of land for the orchard and the continued tilling of land inbetween is likely to increase bare ground, dust and the land's susceptibility to erosion. Although of low intensity given the predominantly turf substrate, this impact should not be underplayed given the site's position within a drainage feature.	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**	Medium	2
	With	Negative	Site specific	1	Long term (>15 years)	4	Low	1	High reversibility	Low irreplaceability	Probable (25-50% chance)	0.5	**Low**	**3**	Medium	2
Sensory disturbances																
Sensory disturbance of fauna from noise, dust and light pollution during construction will cause many fauna to vacate the site, at least temporarily. Animals that would be most adversely affected include calling species (such as potentially occurring CI Secretarybird), and secretive and or nocturnal species (such as bats, hedgehogs and bullfrog).	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	Medium-low	2	Low reversibility	Low irreplaceability	Probable (25-50% chance)	0.5	**Low**	**4**	High	3
	With	Negative	Site specific	1	Temporary (<2 years)	1	Low	1	High reversibility	Low irreplaceability	Probable (25-50% chance)	0.5	**Low**	**2**	High	3
OPERATION																
Deterioration of Water Quality and impact on downstream aquatic ecology																
Currently an open gutter conveys pig effluent away from the piggery towards (but not yet linking to) an open concrete pit. As such pig effluent is being discharged directly into the receiving environment. This is a major potential impact that will need to be addressed accordingly given the sites position within a drainage feature that feeds the Kutswane River. Various contaminants are present in pig effluents including nutrients, pathogens, veterinary pharmaceuticals (including, *inter alia*, antibiotics) and naturally excreted hormones. A piggery can also cause elevated EC, TDS and salinity concentrations due to the increased of the ions and salts, namely calcium (Ca^{2+}), magnesium, sodium, nitrate and chloride (Cl^{-}). Inappropriate slurry management and improper disposal of carcasses as well as excess fodder and chemicals (herbicides and pesticides) or fertilizers used for vegetable or fruit production or any other operational waste could cause a deterioration of the downstream water quality .	Without	Negative	Regional (within 30km of site)	3	Long term (>15 years)	4	Medium	4	Low reversibility	Moderate irreplaceability	Definite (>90% chance)	1	**High**	**11**	Low	1
	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 invertebrate pests																
Substandard animal husbandry / hygiene and waste generation in the form of pig effluent, excess fodder and fertiliser has the potential, if improperly managed, to facilitate aggregation and/or breeding of invertebrate pests such as flies, weevils, ants, termites, cockroaches, fleas, lice, mites, ticks, etc.	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
Poor / Inappropriate control of vertebrate pests																

POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT		DURATION		INTENSITY		REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	PROBABILITY	SIGNIFICANCE		CONFIDENCE	
			RATING	S	RATING	S	RATING	S	RATING	RATING	RATING	SCORE	RATING	S	RATING	S
As above, poor waste management and pig hygiene practices has the potential to attract vertebrate pests including rodents (Black Rat, House Mouse), carnivores (Black-backed Jackal, dogs, cats) and birds (Common Myna, Pied Crow, Sacred Ibis, Cattle Egret and Black-headed Heron). Furthermore, proliferation of pest alien animals could adversely affect indigenous fauna through competition, predation and disease transmission.	Without	Positive	Local (<2km from site)	2	Long term (>15 years)	4	Medium	4	Low reversibility	Low irreplaceability	Highly probable (50-90% chance)	0.75	**Medium**	**8**	High	3
	With	Positive	Site specific	1	Medium term (5-15 years)	3	Low	1	Moderate reversibility	Low irreplaceability	Probable (25-50% chance)	0.5	**Low**	**3**	Medium	2
Transmission of diseases																
The current open gutter system on site for conveying pig effluent is problematic in this regard. Fauna particularly birds are able to feed directly on this and indeed several Sacred Ibises and Cattle Egrets were observed doing just that. This open trenching setup (if continued into operation) is not advised as diseases could be transmitted either directly from pigs and their effluent, or indirectly from an increased prevalence of pests, which could in turn adversely affect the population dynamics of fauna in the surrounding area. If carcasses are to be burned/disposed of on site (strictly ill-advised) the potential for disease transmission would increase infinitely.	Without	Negative	Local (<2km from site)	2	Long term (>15 years)	4	High	8	Moderate reversibility	Low irreplaceability	Highly probable (50-90% chance)	0.75	**High**	**11**	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
Reduction in CI Species - Harvesting of CI or medicinal flora																
During Operations, CI species such as the stapeliads may be reduced due to harvesting by those entering the site and the surrounds. The probability, however, is considered to be low.	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
Altered burning																
The incidence of wild fires on site and in the area could increase or decrease to the possible detriment of native flora and fauna. Although fires might result unintentionally with carcass or fire-break burning, for example, it is more likely that burning will be prohibited as far as possible for human and infrastructural safety. If to frequent fires could adversely affect potentially occurring CI species such as hedgehogs, bullfrogs or large terrestrial birds (e.g. Secretarybird).	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
Introduction & proliferation of alien spp. - Competition and change in structure																
During Operation an increase in invasive alien species could occur from seeds in excess fodder, pig effluent as well as from influx of vehicles etc, and lack of alien species control.	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
Sensory disturbances																

POTENTIAL IMPACTS	MITIGATION	STATUS	EXTENT		DURATION		INTENSITY		REVERSIBILITY	IRREPLACEABILITY	PROBABILITY	PROBABILITY	SIGNIFICANCE		CONFIDENCE	
			RATING	S	RATING	S	RATING	S	RATING	RATING	RATING	SCORE	RATING	S	RATING	S
Sensory Disturbances to fauna on site may be caused by noise from the pigs and vehicles, light pollution (certain bat species and other nocturnal fauna) and general effluent / waste . These may affect behavioural patterns and interfere with important life history patterns such as breeding, lekking etc. It is likely that medium to large mammals particularly carnivores as well as large terrestrial birds will be the most adversely affected. Although a certain spectrum of common and generally commensal species may be tolerant of (Hadeda, House, Grey-headed and Cape Sparrows) or even attracted to such disturbances (E.g. Cape Serotine and Egyptian Free-tailed Bats)	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 & proliferation of alien spp. - Competition and change in structure																
If no rehabilitation and monitoring efforts are implemented, alien species could continue to increase and spread specifically around fallow fields and building remnants.	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
Sensory disturbances																
Fauna are likely to experience a temporary increase in sensory disturbance during decommissioning due to increased vehicle and human activity, noise and dust.	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 METHODOLOGY	FREQUENCY	RESPONSIBILITY
CONSTRUCTION				
Direct loss of terrestrial vegetation and faunal habitat				
Avoid unnecessary loss of vegetation and faunal habitats	Restrict all habitat loss and disturbances from construction activities to within the proposed and agreed upon site layout (i.e. expansion of existing infrastructure not new stand-alone infrastructure). Stay out of the *Open Acacia Sandy Bushveld* area	*Ensure that expansion of the facility and all associated infrastructure avoid all Very High and High sensitive areas.	During design	CSIR / Legae La Thlago Management
		*Clearly demarcate or fence in the construction site. Relocate specimens that are situated in the construction footprint, according to the advice of an appropriate specialist	Pre-construction	CSIR / Legae La Thlago 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	Legae La Thlago 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	Legae La Thlago Management, Construction Crew, with advice from a Botanist /Horticulturist
	Avoid unnecessary loss of indigenous trees for orchards or croplands.	*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	Legae La Thlago Management, Construction Crew, with advice from an Ecologist
Loss of CI or medicinal flora				

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING METHODOLOGY	FREQUENCY	RESPONSIBILITY
Minimize loss of CI or medicinally important flora, in accordance with law and best practice, and encourage rehabilitation.	If any of the remaining natural areas are to be affected, adhere to law and best practice guidelines regarding the displacement of CI and medicinally important floral species.	*If removing CI species such as the **Protected** Marulas or stapeliads then submit permits for their removal.	Pre-construction	CSIR / Legae La Thlago Management
		*Prior to construction any CI and medicinally important floral specimens that may occur within the site layout footprint (areas zoned for the piggery, effluent dam, orchard or cropland) should be collected and replanted in the surrounding areas.	Pre-construction	Botanist / horticulturist
		*Guidance from a suitably qualified vegetation specialist or horticulturist regarding the collection, propagation/storage and transplantation of plants is advised.	During construction	Botanist / horticulturist
Loss of Wetlands				
In line with the mitigation hierarchy, the avoidance of wetland loss is a priority	To re-align the area set aside for piggery expansion to avoid the wetland and associated wetland buffer	Re-align the piggery expansion in a north-easterly/south-westerly direction as opposed to the easterly direction proposed	During design	CSIR / Legae La Thlago Management
Introduction & proliferation of alien spp. - Competition and change in structure				
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	Legae La Thlago Management / Farm Management
		* Removal any alien wooded species that may germinate.	Pre Construction and continued through the life of the project	Legae La Thlago Management / Farm Management
		*Prohibit the introduction of domestic animals such as dogs and cats.	All Phases	Legae La Thlago Management
		*If any landscaping is to be done -Only plant locally indigenous flora.	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	Legae La Thlago 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	Legae La Thlago Management, Construction Crew
Mortality and displacement of fauna (including CI species)				
Minimize mortality and displacement of fauna.	If any of the remaining natural areas are to be affected, adhere to law and best practice guidelines regarding the handling and relocation of CI fauna.	*It is recommended that a suitably qualified specialist be assigned to relocate any CI fauna on site to nearby suitable habitat (i.e. Termitaria that need to be destroyed within the project footprint should be carefully searched for Striped Harlequin Snakes and night time searches for hedgehogs and bullfrogs should be performed).	Pre-construction	Zoologist/Ecologist
	Appropriately deal with fauna on site.	*Ensure that procedures are in place for handling and relocating fauna that need to be moved off site such as bullfrogs.	All Phases	Legae La Thlago Management
		*Ensure that staff are trained and equipped to safely handle fauna (particularly snakes and bullfrogs), or that the services of a trained professional are readily available on call. Buried bullfrogs, which are unearthed during construction activities must be handled and relocated with advice from an appropriate specialist.	All Phases	Legae La Thlago Management/ External Ecologist
	Time construction activities to minimize faunal mortality.	*Construction activities should be timed to start (and preferably end) during winter, when activity levels and the presence of breeding and migratory animal species are lowest.	Pre-construction	Legae La Thlago Management, Construction Crew
	Limit unnecessary mortality, and persecution of fauna.	*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.	Daily during construction	Legae La Thlago Management, Construction Crew, Zoologist
		*Prohibit the further introduction of domestic animals such as dogs and cats.	All Phases	Legae La Thlago Management
		*Educate the team on prohibited actions involving the utilisation of wildlife (i.e. poaching / harvesting) through training and notices.	All Phases	Legae La Thlago Management/ External Ecologist (Advisory Capacity)
		*Routinely walk fence lines and within the Ridge habitat to remove snares.	All Phases	Legae La Thlago Management / Farm Management
Introduction & proliferation of alien spp. - Competition and change in structure				
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	Legae La Thlago Management / Farm Management
		* Removal any alien wooded species that may germinate.	Pre Construction and continued through the life of	Legae La Thlago Management / Farm Management

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING METHODOLOGY	FREQUENCY	RESPONSIBILITY
			the project	
		*Prohibit the introduction of domestic animals such as dogs and cats.	All Phases	Legae La Thlago Management
		*If any landscaping is to be done -Only plant locally indigenous flora.	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	Legae La Thlago 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	Legae La Thlago Management, Construction Crew
Increase in dust and erosion				
Minimize dust and erosion	Implement effective measures to control dust and erosion.	*Limit vehicles, people and materials to the construction site.	During construction	Legae La Thlago 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 downstream Kutswane River. Measures could include 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	
Sensory disturbances				
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	Legae La Thlago Management, Construction Crew
	Limit disturbance from noise.	*Minimize noise to limit its impact on sensitive fauna such as potentially occurring owls, korhaans and secretarybirds.	Prior to and throughout construction	Legae La Thlago Management, Construction Crew
	Limit disturbance from light.	*Limit construction activities to day time hours.	Throughout construction	Legae La Thlago Management, Construction Crew
		*Minimize or eliminate security and construction lighting, to reduce the disturbance of nocturnal fauna.	Throughout construction	Construction Crew
OPERATION				
Deterioration of Water Quality and impact on downstream aquatic ecology				
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.	* Remove the current drain and slurry facility from within the wetland buffer to the adjacent terrestrial zone	During design	CSIR / Legae La Thlago Management/ Agricultural experts
		*It is essential to ensure that the pig houses and associated drains and slurry facility are designed and lined with impermeable substances (e.g. concrete) in accordance with advice from suitably qualified agricultural experts and international best practice norms. The primary aim should be to avoid contamination of the drainage feature.	During design	CSIR / Legae La Thlago Management/ Agricultural experts
		*Ensure that the gutter conveying pig effluent is closed i.e. piped to the slurry pond to prevent spillage and contact with wildlife.	During design	CSIR / Legae La Thlago Management/ Agricultural experts
		*Adhere to best practice pig husbandry and waste disposal norms .	Throughout Operation	CSIR / Legae La Thlago Management/ Agricultural experts
		*Incorporate effective storm water management design aspects into the infrastructure plan	During design	CSIR / Legae La Thlago Management

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING METHODOLOGY	FREQUENCY	RESPONSIBILITY
		*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. The run-off substances should be effectively captured and stored, and later disposed of at an appropriate licensed facility for hazardous waste.	Throughout Operation	Farm Manager and Team
		*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	Legae La Thlago Management and Farm Manager.
	Ensure that there are appropriate control measures in place for any contamination event.	*Rehabilitate contaminated areas a.s.a.p. in accordance with advice from appropriate contamination and environmental specialists.		Legae La Thlago 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	Legae La Thlago Management and Farm Manager.
Management of pest invertebrates				
Highly localized pest invertebrate control that does not affect non-target populations or taxa	Detect and control pest infestations before they become a problem through frequent and careful cleaning, monitoring and control.	• Clean floors regularly. • Provide sufficient ventilation and airflow to keep floors, bedding, and fodder as dry as possible. • Check that fan louvers (if installed) work properly, and close fans completely when off. • Screed concrete floors properly to seal all cracks and limit the pooling of effluent and water. • Use appropriately sloped and slatted floors to facilitate drainage. • Clean up excess fodder regularly from under troughs and feed bins • Effectively drain storm water from around pig houses • Keep areas surrounding pig 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 • Effectively maintain and seal the concrete reservoir, where the storage of pig slurry is planned, to prevent invertebrate animals from accessing the effluent. • 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) • Electrocution devices are available to kill flies, while other mechanical devices include traps, sticky tapes or baited traps.	During design, construction and operation	Legae La Thlago Management and Farm Manager and on-site team.
		• Ensure that measures to control pest invertebrates 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.	When necessary, during operation	
Management of pest vertebrates				
Minimal and humane control of pest vertebrates that does not affect non-target individuals or taxa.	Detect pest infestations before they become a problem through frequent and careful monitoring.	• Effectively maintain and seal the concrete reservoir, where the storage of pig slurry is planned, to prevent vertebrate animals from accessing the effluent • Manage and prevent access to fodder, especially feed wastage around the houses, feeders. • Control rodents through effective sanitation, rodent proofing and killing. • Glue boards and traps can be used in small areas, but in larger areas (over 12,000 sq ft) baits are more practical. • Rodenticides are not advised. • The most effective control for indigenous birds is screening production house air inlets and open windows with 2x2cm wire mesh.	When necessary, during operation	Legae La Thlago Management and Farm Manager
Transmission of diseases				
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	• Maintain the appropriate pest control measures	Life of operation particularly at the onset of the rainy season	Farm Manager and Team

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING METHODOLOGY	FREQUENCY	RESPONSIBILITY
	bedding, by thoroughly sealing these areas using effective, humane and environmentally-friendly means.	• 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. The run-off substances should be effectively captured and stored, and later disposed of at an appropriate licensed facility for hazardous waste.	Throughout Operation	Farm Manager and Team
		• Effectively maintain and seal the concrete reservoir, where the storage of pig slurry is planned, to prevent invertebrate and vertebrate animals from accessing the effluent	Throughout Operation	Farm Manager and Team
Harvesting 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.	• Education of the Farm Management and team required prior to operation and with yearly refresher talks.	When necessary, during 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 /Legae La Thlago Management and Farm Manager
		• Maintain an effective fire break between the development area and the surrounding natural environment (especially the ridge to the north, where the fire-dependent Highveld Blue butterfly may occur)	Prior to, and at least annually during operation	CSIR /Legae La Thlago Management and Farm Manager
		• Educate workers about the plan and emergency procedures with regular training and notices.	At least annually during operation	CSIR /Legae La Thlago Management and Farm Manager
Introduction & proliferation of alien spp.				
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	Legae La Thlago Management and Farm Manager
		• Prohibit the introduction of domestic animals such as dogs and cats.		
		• Only plant locally indigenous flora (if landscaping is to be implement).		
	Maintain a neat and tidy production facility.	• Employ best practices regarding the tilling of soil and weed management.		Farm Management/Agricultural experts
		• Minimize the accumulation or dispersal of excess fodder on site.		Farm Management
	By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit.	• Mechanical removal of these species is recommended. However, the removal must be carefully performed so as to not excessively disturb the soil layer. Alien debris could be donated to a local community. Be especially pro-active around the pig effluent slurry dam, fodder loading bays as well as in and around the croplands.		CSIR /Legae La Thlago Management and Farm Manager, with advice from a floral specialist
Sensory disturbances				
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	Legae La Thlago Management and Farm Manager
	Limit the effects of noise from pigs and operational activities on fauna such as carnivores, owls, korhaans and Secretarybirds.	Minimize unavoidable noise. • Conduct regular maintenance of machinery and pig house ventilation systems / fans (if any). • Implement an automated pig feeding system to reduce pig noise upon human entry at feeding times.	Prior to and during operation	Legae La Thlago Management and Farm Manager/ External Noise Specialists
DECOMMISSIONING				
Introduction & proliferation of alien spp. - Competition and change in structure				

OBJECTIVE / TARGET	MITIGATION / MANAGEMENT ACTION	MONITORING METHODOLOGY	FREQUENCY	RESPONSIBILITY
Minimize introduction and spread of invasive alien species during decommissioning	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.	Throughout decommissioning until all Category 1b and Category 2 alien species have been effectively removed from the site	Legae La Thlago Management / Farm Management
Sensory disturbances				
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 such as owls, korhaans and Secretarybirds.	Throughout decommissioning	Legae La Thlago Management / Farm Management
	Limit disturbance from light.	• Limit demolition activities to day time hours.	Throughout decommissioning	Legae La Thlago Management / Farm Management
		• Minimize or eliminate security and other lighting, to reduce the disturbance of nocturnal fauna.	Throughout decommissioning	Legae La Thlago Management / Farm Management
	Effectively control dust.	• Implement environmentally-friendly dust control measures (e.g. mulching and wetting) where and when dust is problematic.	When necessary, during decommissioning	Legae La Thlago Management / Farm Management
		• Rehabilitate contaminated areas a.s.a.p. in accordance with advice from appropriate specialists. Implement the selected control measure(s) where dust is problematic. Revegetate denude areas with locally indigenous flora a.s.a.p.	Decommissioning onwards	Legae La Thlago Management / Farm Management

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12. Appendices

12.1. Appendix 1 POSA Listed Species

Family		Species	Growth forms
ACANTHACEAE		*Barleria bolusii Oberm.*	Herb
ACANTHACEAE		*Blepharis integrifolia (L.f.) E.Mey. ex Schinz var. integrifolia*	Herb
ACANTHACEAE		*Blepharis serrulata (Nees) Ficalho & Hiern*	Dwarf shrub
ACANTHACEAE		*Crabbea angustifolia Nees*	Herb
ACANTHACEAE		*Crabbea ovalifolia Ficalho & Hiern*	Herb
ACANTHACEAE		*Dyschoriste transvaalensis C.B.Clarke*	Dwarf shrub
ACANTHACEAE		*Hypoestes forskaolii (Vahl) R.Br.*	Herb
ACANTHACEAE		*Justicia flava (Vahl) Vahl*	Dwarf shrub
ACHARIACEAE		*Kiggelaria africana L.*	Shrub, tree
AMARANTHACEAE		*Achyropsis leptostachya (E.Mey. ex Meisn.) Baker & C.B.Clarke*	Herb
AMARANTHACEAE		*Aerva leucura Moq.*	Herb
AMARANTHACEAE		*Cyathula lanceolata Schinz*	Herb
AMARANTHACEAE		*Hermbstaedtia odorata (Burch.) T.Cooke var. aurantiaca (Suess.) C.C.Towns.*	Herb
AMARANTHACEAE		*Pupalia lappacea (L.) A.Juss. var. lappacea*	Herb
ANACARDIACEAE		*Ozoroa paniculosa (Sond.) R.& A.Fern. var. salicina (Sond.) R.& A.Fern.*	Shrub, tree
ANACARDIACEAE		*Sclerocarya birrea (A.Rich.) Hochst. subsp. caffra (Sond.) Kokwaro*	Tree
ANACARDIACEAE		*Searsia leptodictya (Diels) T.S.Yi, A.J.Mill. & J.Wen forma leptodictya*	Shrub, tree
ANACARDIACEAE		*Searsia pyroides (Burch.) Moffett var. gracilis (Engl.) Moffett*	Shrub, tree
ANACARDIACEAE		*Searsia pyroides (Burch.) Moffett var. pyroides*	Tree
ANACARDIACEAE		*Searsia zeyheri (Sond.) Moffett*	Shrub

Family		Species	Growth forms
ANTHERICACEAE		*Chlorophytum recurvifolium (Baker) C.Archer & Kativu*	Herb
APOCYNACEAE		*Asclepias aurea (Schltr.) Schltr.*	Herb
APOCYNACEAE		*Asclepias densiflora N.E.Br.*	Herb
APOCYNACEAE		*Asclepias eminens (Harv.) Schltr.*	Herb
APOCYNACEAE		*Brachystelma discoideum R.A.Dyer*	Geophyte
APOCYNACEAE		*Cryptolepis oblongifolia (Meisn.) Schltr.*	Scrambler
APOCYNACEAE		*Gomphocarpus rivularis Schltr.*	Shrub
APOCYNACEAE		*Huernia transvaalensis Stent*	Succulent
APOCYNACEAE		*Pachycarpus schinzianus (Schltr.) N.E.Br.*	Succulent
APOCYNACEAE		*Raphionacme velutina Schltr.*	Succulent
APOCYNACEAE		*Sarcostemma viminale (L.) R.Br. subsp. viminale*	Climber
ARCHIDIACEAE		*Archidium acanthophyllum Snider*	Bryophyte
ASPARAGACEAE		*Asparagus exuvialis Burch. forma ecklonii (Baker) Fellingham & N.L.Mey.*	Shrub
ASPHODELACEAE		*Aloe zebrina Baker*	Succulent
ASPHODELACEAE		*Bulbine angustifolia Poelln.*	Geophyte
ASPLENIACEAE		*Asplenium cordatum (Thunb.) Sw.*	Geophyte
ASTERACEAE		*Artemisia afra Jacq. ex Willd. var. afra*	Herb, shrub
ASTERACEAE		*Callilepis leptophylla Harv.*	Herb
ASTERACEAE		*Denekia capensis Thunb.*	Herb
ASTERACEAE		*Dicoma anomala Sond. subsp. gerrardii (Harv. ex F.C.Wilson) S.Ortíz & Rodr.Oubiña*	Herb
ASTERACEAE		*Doellia cafra (DC.) Anderb.*	Herb
ASTERACEAE		*Geigeria burkei Harv. subsp. burkei var. burkei*	Herb
ASTERACEAE		*Haplocarpha scaposa Harv.*	Herb
ASTERACEAE		*Helichrysum argyrosphaerum DC.*	Herb
ASTERACEAE		*Helichrysum candolleanum H.Buek*	Herb
ASTERACEAE		*Helichrysum cerastioides DC. var. cerastioides*	Herb
ASTERACEAE		*Helichrysum dasymallum Hilliard*	Herb
ASTERACEAE		*Helichrysum setosum Harv.*	Shrub
ASTERACEAE		*Kleinia fulgens Hook.f.*	Succulent
ASTERACEAE		*Pentzia lanata Hutch.*	Shrub
ASTERACEAE		*Pseudognaphalium oligandrum (DC.) Hilliard & B.L.Burtt*	Herb
ASTERACEAE		*Senecio pentactinus Klatt*	Herb, shrub
ASTERACEAE		*Senecio pleistocephalus S.Moore*	Climber
ASTERACEAE		*Senecio serratuloides DC.*	Herb
ASTERACEAE		*Vernonia fastigiata Oliv. & Hiern*	Herb
ASTERACEAE		*Vernonia sutherlandii Harv.*	Herb
ASTERACEAE	*	*Acanthospermum australe (Loefl.) Kuntze*	Herb
ASTERACEAE	*	*Acanthospermum hispidum DC.*	Herb
ASTERACEAE	*	*Conyza sumatrensis (Retz.) E.Walker var. sumatrensis*	Herb
BORAGINACEAE		*Ehretia rigida (Thunb.) Druce subsp. nervifolia Retief & A.E.van Wyk*	Shrub
BRYACEAE		*Bryum pycnophyllum (Dixon) Mohamed*	Bryophyte
BUDDLEJACEAE		*Nuxia congesta R.Br. ex Fresen.*	Shrub, tree
CAMPANULACEAE		*Wahlenbergia magaliesbergensis Lammers*	Dwarf shrub
CAMPANULACEAE		*Wahlenbergia undulata (L.f.) A.DC.*	Herb
CAPPARACEAE		*Boscia albitrunca (Burch.) Gilg & Gilg-Ben.*	Shrub, tree
CAPPARACEAE		*Cleome maculata (Sond.) Szyszyl.*	Herb
CAPPARACEAE		*Cleome monophylla L.*	Herb
CARYOPHYLLACEAE		*Pollichia campestris Aiton*	Herb
CELASTRACEAE		*Gymnosporia buxifolia (L.) Szyszyl.*	Shrub, tree

Family		Species	Growth forms
CELASTRACEAE		*Gymnosporia tenuispina (Sond.) Szyszyl.*	Shrub
CHRYSOBALANACEAE		*Parinari capensis Harv. subsp. capensis*	Dwarf shrub
COMBRETACEAE		*Combretum apiculatum Sond. subsp. apiculatum*	Shrub, tree
COMBRETACEAE		*Combretum imberbe Wawra*	Shrub, tree
COMBRETACEAE		*Combretum molle R.Br. ex G.Don*	Tree
COMBRETACEAE		*Combretum zeyheri Sond.*	Shrub, tree
COMBRETACEAE		*Terminalia sericea Burch. ex DC.*	Tree
COMMELINACEAE		*Aneilema hockii De Wild.*	Herb
COMMELINACEAE		*Commelina africana L. var. lancispatha C.B.Clarke*	Herb
COMMELINACEAE		*Commelina benghalensis L.*	Herb
CONVOLVULACEAE		*Evolvulus alsinoides (L.) L.*	Herb
CONVOLVULACEAE		*Ipomoea gracilisepala Rendle*	Herb
CONVOLVULACEAE		*Ipomoea magnusiana Schinz*	Herb
CONVOLVULACEAE		*Ipomoea obscura (L.) Ker Gawl. var. obscura*	Herb
CONVOLVULACEAE		*Seddera suffruticosa (Schinz) Hallier f.*	Dwarf shrub, herb
CONVOLVULACEAE		*Xenostegia tridentata (L.) D.F.Austin & Staples subsp. angustifolia (Jacq.) Lejoly & Lisowski*	Herb
CRASSULACEAE		*Crassula lanceolata (Eckl. & Zeyh.) Endl. ex Walp. subsp. transvaalensis (Kuntze) Toelken*	Succulent
CUCURBITACEAE		*Corallocarpus triangularis Cogn.*	Climber
CUCURBITACEAE		*Cucumis zeyheri Sond.*	Herb
CYPERACEAE		*Bulbostylis burchellii (Ficalho & Hiern) C.B.Clarke*	Cyperoid
CYPERACEAE		*Cyperus decurvatus (C.B.Clarke) C.Archer & Goetgh.*	Cyperoid
CYPERACEAE		*Cyperus difformis L.*	Cyperoid
CYPERACEAE		*Cyperus laevigatus L.*	Cyperoid
CYPERACEAE		*Cyperus rubicundus Vahl*	Cyperoid
CYPERACEAE		*Cyperus rupestris Kunth var. rupestris*	Cyperoid
CYPERACEAE		*Cyperus sexangularis Nees*	Cyperoid
DIPSACACEAE		*Scabiosa columbaria L.*	Herb
EBENACEAE		*Euclea crispa (Thunb.) Gürke subsp. crispa*	Shrub, tree
EBENACEAE		*Euclea undulata Thunb.*	Shrub, tree
ELATINACEAE		*Bergia decumbens Planch. ex Harv.*	Dwarf shrub
EUPHORBIACEAE		*Acalypha glabrata Thunb. var. pilosa Pax*	Shrub, tree
EUPHORBIACEAE		*Acalypha indica L. var. indica*	Dwarf shrub
EUPHORBIACEAE		*Croton gratissimus Burch. var. subgratissimus (Prain) Burtt Davy*	Shrub, tree
EUPHORBIACEAE		*Euphorbia inaequilatera Sond.*	Succulent
FABACEAE		*Acacia luederitzii Engl. var. retinens (Sim) J.H.Ross & Brenan*	Shrub, tree
FABACEAE		*Acacia nilotica (L.) Willd. ex Delile subsp. kraussiana (Benth.) Brenan*	Tree
FABACEAE		*Acacia tortilis (Forssk.) Hayne subsp. heteracantha (Burch.) Brenan*	Shrub, tree
FABACEAE		*Dichrostachys cinerea (L.) Wight & Arn. subsp. africana Brenan & Brummitt var. setulosa (Welw. ex Oliv.) Brenan & Brummitt*	Shrub, tree
FABACEAE		*Dolichos angustifolius Eckl. & Zeyh.*	Herb
FABACEAE		*Elephantorrhiza elephantina (Burch.) Skeels*	Dwarf shrub
FABACEAE		*Eriosema cordatum E.Mey.*	Herb
FABACEAE		*Indigofera adenoides Baker f.*	Creeper
FABACEAE		*Indigofera frondosa N.E.Br.*	Shrub
FABACEAE		*Indigofera heterotricha DC.*	Dwarf shrub
FABACEAE		*Mundulea sericea (Willd.) A.Chev. subsp. sericea*	Shrub, tree
FABACEAE		*Ophrestia oblongifolia (E.Mey.) H.M.L.Forbes var. oblongifolia*	Herb
FABACEAE		*Otoptera burchellii DC.*	Climber

Family		Species	Growth forms
FABACEAE		*Peltophorum africanum Sond.*	Tree
FABACEAE		*Rhynchosia albissima Gand.*	Dwarf shrub
FABACEAE		*Rhynchosia confusa Burtt Davy*	Climber
FABACEAE		*Rhynchosia densiflora (Roth) DC. subsp. chrysadenia (Taub.) Verdc.*	Climber
FABACEAE		*Rhynchosia monophylla Schltr.*	Herb
FABACEAE		*Rhynchosia reptabunda N.E.Br.*	Climber
FABACEAE		*Stylosanthes fruticosa (Retz.) Alston*	Dwarf shrub
FABACEAE		*Tephrosia longipes Meisn. subsp. longipes var. longipes*	Dwarf shrub
FABACEAE		*Tephrosia rhodesica Baker f. var. rhodesica*	Dwarf shrub
FABACEAE		*Xerocladia viridiramis (Burch.) Taub.*	Shrub
FABACEAE		*Zornia capensis Pers. subsp. capensis*	Herb
FABACEAE	*	*Trifolium repens L.*	Herb
FISSIDENTACEAE		*Fissidens rufescens Hornsch.*	Bryophyte
GISEKIACEAE		*Gisekia africana (Lour.) Kuntze var. africana*	Herb
HYACINTHACEAE		*Dipcadi marlothii Engl.*	Geophyte
HYACINTHACEAE		*Dipcadi viride (L.) Moench*	Geophyte
HYDROCHARITACEAE		*Lagarosiphon muscoides Harv.*	Hydrophyte
HYPOXIDACEAE		*Hypoxis iridifolia Baker*	Geophyte
JUNCACEAE		*Juncus rigidus Desf.*	Helophyte
LAMIACEAE		*Leucas martinicensis (Jacq.) R.Br.*	Herb
LAMIACEAE		*Ocimum americanum L. var. americanum*	Herb
LAMIACEAE		*Ocimum angustifolium Benth.*	Herb, shrub
LAMIACEAE		*Plectranthus caninus Roth*	Succulent
LAMIACEAE		*Plectranthus neochilus Schltr.*	Succulent
LAMIACEAE		*Rotheca louwalbertsii (P.P.J.Herman) P.P.J.Herman & Retief*	Herb
LAMIACEAE		*Teucrium trifidum Retz.*	Herb
LAMIACEAE		*Vitex zeyheri Sond.*	Tree
LENTIBULARIACEAE		*Utricularia welwitschii Oliv.*	Carnivore
LYCOPODIACEAE		*Lycopodiella cernua (L.) Pic.Serm.*	Geophyte
MALVACEAE		*Abutilon ramosum (Cav.) Guill. & Perr.*	Shrub
MALVACEAE		*Corchorus asplenifolius Burch.*	Herb
MALVACEAE		*Dombeya rotundifolia (Hochst.) Planch. var. rotundifolia*	Shrub, tree
MALVACEAE		*Grewia flava DC.*	Shrub
MALVACEAE		*Grewia occidentalis L. var. occidentalis*	Shrub, tree
MALVACEAE		*Grewia retinervis Burret*	Shrub
MALVACEAE		*Hermannia burkei Burtt Davy*	Climber
MALVACEAE		*Hermannia floribunda Harv.*	Dwarf shrub
MALVACEAE		*Hermannia grisea Schinz*	Dwarf shrub
MALVACEAE		*Hermannia parvula Burtt Davy*	Dwarf shrub
MALVACEAE		*Hermannia quartiniana A.Rich.*	Herb
MALVACEAE		*Hermannia stellulata (Harv.) K.Schum.*	Herb
MALVACEAE		*Hermannia tomentosa (Turcz.) Schinz ex Engl.*	Herb
MALVACEAE		*Hibiscus sidiformis Baill.*	Herb
MALVACEAE		*Melhania acuminata Mast. var. acuminata*	Dwarf shrub
MALVACEAE		*Melhania prostrata DC.*	Dwarf shrub
MALVACEAE		*Sida cordifolia L. subsp. cordifolia*	Dwarf shrub
MALVACEAE		*Triumfetta sonderi Ficalho & Hiern*	Dwarf shrub
MALVACEAE		*Waltheria indica L.*	Herb
MARSILEACEAE		*Marsilea macrocarpa C.Presl*	Hydrophyte
MORACEAE		*Ficus salicifolia Vahl*	Tree
MYROTHAMNACEAE		*Myrothamnus flabellifolius Welw.*	Dwarf shrub

Family		Species	Growth forms
NYCTAGINACEAE		*Commicarpus plumbagineus (Cav.) Standl. var. plumbagineus*	Scrambler
ONAGRACEAE	*	*Oenothera rosea L'Hér. ex Aiton*	Herb
ORCHIDACEAE		*Eulophia welwitschii (Rchb.f.) Rolfe*	Geophyte
OROBANCHACEAE		*Cycnium tubulosum (L.f.) Engl. subsp. tubulosum*	Herb
PARMELIACEAE		*Bulbothrix isidiza (Nyl.) Hale*	Lichen
PEDALIACEAE		*Dicerocaryum senecioides (Klotzsch) Abels*	Herb
PEDALIACEAE		*Pterodiscus speciosus Hook.*	Succulent
POACEAE		*Andropogon chinensis (Nees) Merr.*	Graminoid
POACEAE		*Andropogon eucomus Nees*	Graminoid
POACEAE		*Anthephora pubescens Nees*	Graminoid
POACEAE		*Aristida adscensionis L.*	Graminoid
POACEAE		*Aristida canescens Henrard subsp. canescens*	Graminoid
POACEAE		*Aristida effusa Henrard*	Graminoid
POACEAE		*Aristida meridionalis Henrard*	Graminoid
POACEAE		*Aristida stipitata Hack. subsp. graciliflora (Pilg.) Melderis*	Graminoid
POACEAE		*Bothriochloa insculpta (Hochst. ex A.Rich.) A.Camus*	Graminoid
POACEAE		*Brachiaria brizantha (A.Rich.) Stapf*	Graminoid
POACEAE		*Brachiaria deflexa (Schumach.) C.E.Hubb. ex Robyns*	Graminoid
POACEAE		*Brachiaria nigropedata (Ficalho & Hiern) Stapf*	Graminoid
POACEAE		*Brachiaria serrata (Thunb.) Stapf*	Graminoid
POACEAE		*Brachiaria xantholeuca (Schinz) Stapf*	Graminoid
POACEAE		*Cenchrus ciliaris L.*	Graminoid
POACEAE		*Chloris gayana Kunth*	Graminoid
POACEAE		*Cynodon dactylon (L.) Pers.*	Graminoid
POACEAE		*Dactyloctenium aegyptium (L.) Willd.*	Graminoid
POACEAE		*Digitaria argyrograpta (Nees) Stapf*	Graminoid
POACEAE		*Digitaria eriantha Steud.*	Graminoid
POACEAE		*Digitaria milanjiana (Rendle) Stapf*	Graminoid
POACEAE		*Digitaria seriata Stapf*	Graminoid
POACEAE		*Diheteropogon amplectens (Nees) Clayton var. amplectens*	Graminoid
POACEAE		*Echinochloa colona (L.) Link*	Graminoid
POACEAE		*Echinochloa holubii (Stapf) Stapf*	Graminoid
POACEAE		*Elionurus muticus (Spreng.) Kunth*	Graminoid
POACEAE		*Enneapogon cenchroides (Licht. ex Roem. & Schult.) C.E.Hubb.*	Graminoid
POACEAE		*Enneapogon scoparius Stapf*	Graminoid
POACEAE		*Eragrostis barbinodis Hack.*	Graminoid
POACEAE		*Eragrostis biflora Hack. ex Schinz*	Graminoid
POACEAE		*Eragrostis chloromelas Steud.*	Graminoid
POACEAE		*Eragrostis cilianensis (All.) Vignolo ex Janch.*	Graminoid
POACEAE		*Eragrostis curvula (Schrad.) Nees*	Graminoid
POACEAE		*Eragrostis gummiflua Nees*	Graminoid
POACEAE		*Eragrostis hierniana Rendle*	Graminoid
POACEAE		*Eragrostis inamoena K.Schum.*	Graminoid
POACEAE		*Eragrostis obtusa Munro ex Ficalho & Hiern*	Graminoid
POACEAE		*Eragrostis plana Nees*	Graminoid
POACEAE		*Eragrostis racemosa (Thunb.) Steud.*	Graminoid
POACEAE		*Eragrostis rigidior Pilg.*	Graminoid
POACEAE		*Eragrostis stapfii De Winter*	Graminoid
POACEAE		*Eragrostis superba Peyr.*	Graminoid
POACEAE		*Eragrostis trichophora Coss. & Durieu*	Graminoid

Family		Species	Growth forms
POACEAE		*Eustachys paspaloides (Vahl) Lanza & Mattei*	Graminoid
POACEAE		*Heteropogon contortus (L.) Roem. & Schult.*	Graminoid
POACEAE		*Hyparrhenia anamesa Clayton*	Graminoid
POACEAE		*Hyparrhenia filipendula (Hochst.) Stapf var. pilosa (Hochst.) Stapf*	Graminoid
POACEAE		*Loudetia flavida (Stapf) C.E.Hubb.*	Graminoid
POACEAE		*Loudetia simplex (Nees) C.E.Hubb.*	Graminoid
POACEAE		*Melinis repens (Willd.) Zizka subsp. repens*	Graminoid
POACEAE		*Microchloa caffra Nees*	Graminoid
POACEAE		*Mosdenia leptostachys (Ficalho & Hiern) Clayton*	Graminoid
POACEAE		*Panicum coloratum L. var. coloratum*	Graminoid
POACEAE		*Panicum deustum Thunb.*	Graminoid
POACEAE		*Panicum maximum Jacq.*	Graminoid
POACEAE		*Perotis patens Gand.*	Graminoid
POACEAE		*Pogonarthria squarrosa (Roem. & Schult.) Pilg.*	Graminoid
POACEAE		*Schizachyrium sanguineum (Retz.) Alston*	Graminoid
POACEAE		*Schmidtia pappophoroides Steud.*	Graminoid
POACEAE		*Setaria incrassata (Hochst.) Hack.*	Graminoid
POACEAE		*Setaria sphacelata (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. sphacelata*	Graminoid
POACEAE		*Setaria sphacelata (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. torta (Stapf) Clayton*	Graminoid
POACEAE		*Setaria verticillata (L.) P.Beauv.*	Graminoid
POACEAE		*Sporobolus festivus Hochst. ex A.Rich.*	Graminoid
POACEAE		*Sporobolus fimbriatus (Trin.) Nees*	Graminoid
POACEAE		*Sporobolus ioclados (Trin.) Nees*	Graminoid
POACEAE		*Sporobolus nitens Stent*	Graminoid
POACEAE		*Sporobolus stapfianus Gand.*	Graminoid
POACEAE		*Themeda triandra Forssk.*	Graminoid
POACEAE		*Tragus berteronianus Schult.*	Graminoid
POACEAE		*Tricholaena monachne (Trin.) Stapf & C.E.Hubb.*	Graminoid
POACEAE		*Trichoneura grandiglumis (Nees) Ekman*	Graminoid
POACEAE		*Urochloa brachyura (Hack.) Stapf*	Graminoid
POACEAE		*Urochloa mosambicensis (Hack.) Dandy*	Graminoid
POACEAE	*	*Cymbopogon pospischilii (K.Schum.) C.E.Hubb.*	Graminoid
POLYGALACEAE		*Polygala krumanina Burch. ex Ficalho & Hiern*	Shrub
POLYGONACEAE		*Oxygonum sinuatum (Hochst. & Steud. ex Meisn.) Dammer*	Herb
POLYGONACEAE	*	*Persicaria lapathifolia (L.) Gray*	Helophyte
PONTEDERIACEAE		*Heteranthera callifolia Rchb. ex Kunth*	Hydrophyte
PORTULACACEAE		*Portulaca kermesina N.E.Br.*	Succulent
PORTULACACEAE		*Portulaca quadrifida L.*	Succulent
PORTULACACEAE		*Talinum caffrum (Thunb.) Eckl. & Zeyh.*	Succulent
POTTIACEAE		*Trichostomum brachydontium Bruch*	Bryophyte
POTTIACEAE		*Weissia latiuscula Müll.Hal.*	Bryophyte
PROTEACEAE		*Protea caffra Meisn. subsp. caffra*	Shrub, tree
RHAMNACEAE		*Phylica paniculata Willd.*	Shrub, tree
RHAMNACEAE		*Ziziphus mucronata Willd. subsp. mucronata*	Shrub, tree
RUBIACEAE		*Anthospermum rigidum Eckl. & Zeyh. subsp. pumilum (Sond.) Puff*	Dwarf shrub
RUBIACEAE		*Fadogia homblei De Wild.*	Herb
RUBIACEAE		*Kohautia virgata (Willd.) Bremek.*	Herb
RUBIACEAE		*Otiophora calycophylla (Sond.) Schltr. & K.Schum. subsp. calycophylla*	Herb

Family		Species	Growth forms
RUBIACEAE		*Pavetta zeyheri Sond. subsp. zeyheri*	Shrub, tree
RUBIACEAE		*Spermacoce natalensis Hochst.*	Herb
RUBIACEAE		*Vangueria parvifolia Sond.*	Tree
SANTALACEAE		*Thesium utile A.W.Hill*	Herb, parasite
SAPINDACEAE		*Pappea capensis Eckl. & Zeyh.*	Shrub, tree
SCROPHULARIACEAE		*Chaenostoma leve (Hiern) Kornhall*	Herb
SCROPHULARIACEAE		*Craterostigma plantagineum Hochst.*	Succulent
SCROPHULARIACEAE		*Diclis petiolaris Benth.*	Herb
SCROPHULARIACEAE		*Manulea parviflora Benth. var. parviflora*	Herb
SCROPHULARIACEAE		*Melanospermum foliosum (Benth.) Hilliard*	Herb
SELAGINELLACEAE		*Selaginella dregei (C.Presl) Hieron.*	Geophyte
SINOPTERIDACEAE		*Pellaea calomelanos (Sw.) Link var. calomelanos*	Geophyte
SOLANACEAE		*Lycium cinereum Thunb.*	Dwarf shrub
STRYCHNACEAE		*Strychnos madagascariensis Poir.*	Shrub, tree
STRYCHNACEAE		*Strychnos pungens Soler.*	Shrub, tree
TELOSCHISTACEAE		*Caloplaca ferruginea (Huds.) Th.Fr. forma ferruginea*	Lichen
THYMELAEACEAE		*Gnidia sericocephala (Meisn.) Gilg ex Engl.*	Dwarf shrub
URTICACEAE		*Pouzolzia mixta Solms var. mixta*	Shrub, succulent
VELLOZIACEAE		*Xerophyta humilis (Baker) T.Durand & Schinz*	Herb
VERBENACEAE		*Lantana rugosa Thunb.*	Shrub
VERBENACEAE		*Lippia javanica (Burm.f.) Spreng.*	Shrub
VERBENACEAE		*Lippia wilmsii H.Pearson*	Shrub
VISCACEAE		*Viscum combreticola Engl.*	Parasite
VISCACEAE		*Viscum verrucosum Harv.*	Parasite

12.2. Appendix 2 Present and potentially occurring mammal species

ORDER[1] & SPECIES[2,4]	COMMON NAME[2,4]	CONSERVATION STATUS				
		GLOBAL IUCN[3]	S.A. RED DATA[2,4]	S.A. NEM:BA[3]	[2,4,5]	ATLAS (N) [2,6]
MACROSCELIDEA (Elephant-shrews)						
Elephantulus brachyrhynchus	Short-snouted Elephant-shrew	LC (U)	**DD**	-	2	
Elephantulus myurus	Rock Elephant-shrew	LC (S)	LC	-	4	
EULIPOTYPHLA (Hedgehogs & shrews)						
Myosorex varius	Forest Shrew	LC (S)	**DD**	-	3	
Suncus lixus	Greater Dwarf Shrew	LC (U)	**DD**	-	3	
Suncus varilla	Lesser Dwarf Shrew	LC (U)	**DD**	-	3	
Suncus infinitesimus	Least Dwarf Shrew	LC (U)	**DD**	-	3	
Crocidura mariquensis	Swamp Musk Shrew	LC (U)	**DD**	-	4	
Crocidura fuscomurina	Tiny Musk Shrew	LC (U)	**DD**	-	3	
Crocidura cyanea	Reddish-grey Musk Shrew	LC (S)	**DD**	-	2	
Crocidura silacea	Lesser Grey-brown Musk Shrew	LC (S)	**DD**	-	3	
Crocidura hirta	Lesser Red Musk Shrew	LC (U)	**DD**	-	3	
Atelerix frontalis	Southern African Hedgehog	LC (S)	**NT**	-	2	
PRIMATES (Primates)						
Galago moholi	Southern Lesser Galago	LC (S)	LC	-	2	
Papio ursinus	Chacma Baboon	LC (S)	LC	-	4	
Chlorocebus pygerythrus	Vervet Monkey	LC (S)	LC	-	2	1
CHIROPTERA (Bats)						
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC (U)	**NT**	-	3	

ORDER[1] & SPECIES[2,4]	COMMON NAME[2,4]	CONSERVATION STATUS				
		GLOBAL IUCN[3]	S.A. RED DATA[2,4]	S.A. NEM:BA[3]	[2,4,5,6]	ATLAS[2,6]
Rhinolophus darlingi	Darling's Horseshoe Bat	LC (U)	**NT**	-	4	
Rhinolophus blasii	Blasius's Horseshoe Bat	LC (D)	**NT**	-	4	
Rhinolophus simulator	Bushveld Horseshoe Bat	LC (D)	**NT**	-	3	
Cloeotis percivali	Percival's Short-eared Trident Bat	LC (U)	**VU**	-	4	
Taphozous mauritianus	Mauritian Tomb Bat	LC (U)	LC	-	3	
Sauromys petrophilus	Roberts's Flat-headed Bat	LC (S)	LC	-	3	
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC (U)	LC	-	2	
Miniopterus natalensis	Natal Long-fingered Bat	LC (U)	**NT**	-	4	
Pipistrellus rusticus	Rusty Pipistrelle	LC (U)	LC	-	3	
Neoromicia capensis	Cape Serotine	LC (S)	LC	-	2	
Myotis tricolor	Temminck's Myotis	LC (U)	LC	-	4	
Scotophilus dinganii	Yellow-bellied House Bat	LC (U)	LC	-	2	
Nycteris thebaica	Egyptian Slit-faced Bat	LC (U)	LC	-	2	
LAGOMORPHA (Hares & rabbits)						
Lepus saxatilis	Scrub Hare	LC (D)	LC	-	1	
Pronolagus randensis	Jameson's Red Rock Rabbit	LC (U)	LC	-	4	
RODENTIA (Rodents)						
Cryptomys hottentotus	Common Mole-rat	LC (S)	LC	-	1	1
Hystrix africaeaustralis	Porcupine	LC (S)	LC	-	2	1
Pedetes capensis	Springhare	LC (U)	LC	-	2	
Thryonomys swinderianus	Greater Cane Rat	LC (U)	LC	-	2	
Xerus inauris	Cape Ground Squirrel	LC (S)	LC	-	2	
Paraxerus cepapi	Tree Squirrel	LC (S)	LC	-	3	
Graphiurus platyops	Rock Dormouse	LC (U)	**DD**	-	3	
Graphiurus murinus	Woodland Dormouse	LC (S)	LC	-	3	
Mystromys albicaudatus	White-tailed Rat	**EN (D)**	**EN**	-	3	
Lemniscomys rosalia	Single-striped Mouse	LC (S)	**DD**	-	2	
Rhabdomys pumilio	Striped Mouse	LC (S)	LC	-	2	
Dasymys incomtus	Water Rat	LC (U)	**NT**	-	2	
Mastomys natalensis	Natal Multimammate Mouse	LC (S)	LC	-	2	
Mastomys coucha	Multimammate Mouse	LC (S)	LC	-	2	
Myomyscus verreauxii	Verreaux's Mouse	LC (S)	LC	-	2	
Aethomys namaquensis	Namaqua Rock Mouse	LC (S)	LC	-	2	
Aethomys ineptus	Tete Veld Rat	LC (U)	LC	-	2	
Otomys angoniensis	Angoni Vlei Rat	LC (S)	LC	-	2	
Otomys irroratus	Vlei Rat	LC (S)	LC	-	2	
Tatera leucogaster	Bushveld Gerbil	LC (S)	**DD**	-	2	
Tatera brantsii	Highveld Gerbil	LC (U)	LC	-	2	
Saccostomus campestris	Pouched Mouse	LC (S)	LC	-	2	
Dendromus melanotis	Grey Climbing Mouse	LC (S)	LC	-	2	
Dendromus mystacalis	Chestnut Climbing Mouse	LC (S)	LC	-	2	
Steatomys pratensis	Fat Mouse	LC (S)	LC	-	2	
CARNIVORA (Carnivores)						
Proteles cristatus	Aardwolf	LC (S)	LC	-	2	
Hyaena brunnea	Brown Hyaena	**NT (D)**	**NT**	**PS**	2	
Panthera pardus	Leopard	**NT (D)**	LC	**PS**	3	1
Caracal caracal	Caracal	LC (U)	LC	-	2	
Felis silvestris	African Wild Cat	LC (D)	LC	-	2	
Felis nigripes	Black-footed Cat	**VU (D)**	LC	**PS**	3	

ORDER[1] & SPECIES[2,4]	COMMON NAME[2,4]	CONSERVATION STATUS				
		GLOBAL IUCN[3]	S.A. RED DATA[2,4]	S.A. NEM:BA[3]	[2,4,5]	[2,6]
Leptailurus serval	Serval	LC (S)	**NT**	**PS**	2	
Genetta genetta	Small-spotted Genet	LC (S)	LC	-	2	
Genetta tigrina	Large-spotted Genet	LC (U)	LC	-	2	
Suricata suricatta	Suricate	LC (U)	LC	-	3	
Cynictis penicillata	Yellow Mongoose	LC (S)	LC	-	2	
Herpestes sanguineus	Slender Mongoose	LC (S)	LC	-	2	3
Ichneumia albicauda	White-tailed Mongoose	LC (S)	LC	-	2	
Atilax paludinosus	Water Mongoose	LC (D)	LC	-	3	
Mungos mungo	Banded Mongoose	LC (S)	LC	-	2	
Helogale parvula	Dwarf Mongoose	LC (S)	LC	-	2	
Otocyon megalotis	Bat-eared Fox	LC (U)	LC	-	3	
Vulpes chama	Cape Fox	LC (S)	LC	**PS**	2	
Canis mesomelas	Black-backed Jackal	LC (S)	LC	-	2	5
Aonyx capensis	Cape Clawless Otter	LC (S)	LC	-	4	
Lutra maculicollis	Spotted-necked Otter	LC (D)	**NT**	-	4	
Mellivora capensis	Honey Badger	LC (D)	**NT**	-	3	1
Poecilogale albinucha	African Weasel	LC (U)	**DD**	-	2	
Ictonyx striatus	Striped Polecat	LC (S)	LC	-	2	
TUBULIDENTATA (Aardvark)						
Orycteropus afer	Aardvark	LC (U)	LC	**PS**	3	
HYRACOIDEA (Dassies)						
Procavia capensis	Rock Hyrax	LC (U)	LC	-	4	
PERISSODACTYLA (Zebras)						
Ceratotherium simum	White Rhinoceros	**NT (I)**	LC	**PS**	5	
Equus zebra zebra	Cape Mountain Zebra	**VU (U)***	**VU**	**PS**	5	
Equus quagga	Plains Zebra	LC (S)	LC	-	5	7
ARTIODACTYLA (Even-toed ungulates)						
Phacochoerus africanus	Warthog	LC (S)	LC	-	2	
Hippopotamus amphibius	Hippopotamus	**VU (D)**	LC	-	5	1
Giraffa camelopardalis camelopardalis	Giraffe	LC (D)	LC	-	5	3
Syncerus caffer	Cape Buffalo	LC (D)	LC	-	5	1
Tragelaphus strepsiceros	Kudu	LC (S)	LC	-	5	10
Tragelaphus angasii	Nyala	LC (S)	LC	-	5	4
Tragelaphus scriptus	Bushbuck	LC (S)	LC	-	5	
Tragelaphus oryx	Eland	LC (S)	LC	-	5	3
Connochaetes gnou	Black Wildebeest	LC (I)	LC	**PS**	5	1
Connochaetes taurinus taurinus	Blue Wildebeest	LC (S)	LC	-	5	6
Alcelaphus buselaphus	Red Hartebeest	LC (D)	LC	-	5	5
Damaliscus pygargus pygargus	Bontebok	LC (S)	**VU**	**PS**	5	1
Damaliscus pygargus phillipsi	Blesbok	LC (S)	LC	-	5	8
Damaliscus lunatus	Tsessebe	LC (D)	**EN**	**PS**	5	
Hippotragus equinus	Roan	LC (D)	**VU**	**EN**	5	1
Hippotragus niger niger	Sable	LC (S)	**VU**	-	5	2
Oryx gazella	Gemsbok	LC (S)	LC	-	5	3
Sylvicapra grimmia	Common Duiker	LC (S)	LC	-	5	4
Redunca arundinum	Reedbuck	LC (S)	LC	-	5	
Redunca fulvorufula	Mountain Reedbuck	LC (S)	LC	-	4	2
Kobus ellipsiprymnus ellipsiprymnus	Waterbuck	LC (D)	LC	-	5	5
Pelea capreolus	Grey Rhebok	LC (S)	LC	-	5	

ORDER[1] & SPECIES[2,4]	COMMON NAME[2,4]	CONSERVATION STATUS			[illegible]	[illegible]
		GLOBAL IUCN[5]	S.A. RED DATA[2,4]	S.A. NEM:BA[3]	[illegible]	[illegible]
Antidorcas marsupialis	Springbok	LC (I)	LC	-	5	1
Ourebia ourebi	Oribi	LC (D)	EN	EN	5	
Raphicerus campestris	Steenbok	LC (S)	LC	-	2	6
Aepyceros melampus	Impala	LC (S)	LC	-	5	13
Oreotragus oreotragus	Klipspringer	LC (S)	LC	-	4	

Key

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

Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate; 4 = Low/unlikely; 5 = May occur as a managed population

Sources: [1]Stuart & Stuart (2007); [2]Friedmann & Daly (2004); [3]ToPS List (2015); [4]Monadjem *et al.* (2010); [5]IUCN (2015.4); [6]MammalMap (2016)

12.3. Appendix 3 Present and potentially occurring bird species

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[5]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
1. Ocean birds									
Pelecanus rufescens	Pink-backed Pelican	LC (S)	VU/LC	-	4				
Sterna caspia	Caspian Tern	LC (I)	VU/LC	-	4				
2. Inland water birds									
Phalacrocorax carbo	White-breasted Cormorant	LC (I)	LC	-	4				x
Phalacrocorax africanus	Reed Cormorant	LC (D)	LC	-	4	33.33			x
Anhinga rufa	African Darter	LC (D)	LC	-	4				x
Ardea cinerea	Grey Heron	LC (U)	LC	-	2				x
Ardea melanocephala	Black-headed Heron	LC (I)	LC	-	2	16.67			x
Ardea goliath	Goliath Heron	LC (S)	LC	-	4				
Ardea purpurea	Purple Heron	LC (D)	LC	-	2				x
Casmerodius albus	Great White Egret	LC (U)	LC	-	3				x
Egretta garzetta	Little Egret	LC (I)	LC	-	3	8.33			x
Mesophoyx intermedia	Yellow-billed Egret	LC (D)	LC	-	3				x
Bubulcus ibis	Cattle Egret	LC (I)	LC	-	1	100			x
Ardeola ralloides	Squacco Heron	LC (D)	LC	-	4				
Butorides striata	Green-backed Heron	LC (D)	LC	-	3				x
Egretta ardesiaca	Black Heron	LC (S)	LC	-	4				
Ixobrychus sturmii	Dwarf Bittern	LC (U)	LC (B)	-	4				
Nycticorax nycticorax	Black-crowned Night-heron	LC (D)	LC	-	4				
Scopus umbretta	Hamerkop	LC (S)	LC	-	3	8.33			x
Leptoptilos crumeniferus	Marabou Stork	LC (I)	**NT/LC**	**-**	3				
Mycteria ibis	Yellow-billed Stork	LC (D)	**EN/LC**	**-**	4				
Ciconia nigra	Black Stork	LC (U)	**VU/LC**	-	3				
Ciconia ciconia	White Stork	LC (I)	LC (NB)	-	3				x
Threskiornis aethiopicus	African Sacred Ibis	LC (D)	LC	-	1	16.67			x
Plegadis falcinellus	Glossy Ibis	LC (D)	LC	-	2	8.33			
Bostrychia hagedash	Hadeda Ibis	LC (I)	LC	-	1	58.33			x
Platalea alba	African Spoonbill	LC (S)	LC	-	4				x
Phoenicopterus roseus	Greater Flamingo	LC (I)	NT/LC	-	4				
Glareola nordmanni	Black-winged Pratincole	**NT (D)**	**NT/NT**	**-**	4				

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN [3]	S.A. RED DATA [3]	S.A. NEM:BA [2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Larus cirrocephalus	Grey-headed Gull	LC (S)	LC	-	4				
Chlidonias leucopterus	White-winged Tern	LC (S)	LC (NB)	-	4				
Chlidonias hybrida	Whiskered Tern	LC (S)	LC	-	4				x
Ciconia abdimii	Abdim's Stork	LC (D)	NT/LC	-	2				
3. Ducks & wading birds									
Podiceps cristatus	Great Crested Grebe	LC (U)	LC	-	4				x
Tachybaptus ruficollis	Little Grebe	LC (D)	LC	-	4	8.33			x
Plectropterus gambensis	Spur-winged Goose	LC (I)	LC	-	3				x
Alopochen aegyptiaca	Egyptian Goose	LC (D)	LC	-	2	8.33			x
Tadorna cana	South African Shelduck	LC (I)	LC	-	4				
Sarkidiornis melanotos	Comb Duck	LC (D)	LC	-	4				
Anas smithii	Cape Shoveler	LC (I)	LC	-	4				
Anas sparsa	African Black Duck	LC (D)	LC	-	4	16.67			
Anas undulata	Yellow-billed Duck	LC (S)	LC	-	4				x
Anas erythrorhyncha	Red-billed Teal	LC (D)	LC	-	4				x
Anas capensis	Cape Teal	LC (I)	LC	-	4				
Anas hottentota	Hottentot Teal	LC (D)	LC	-	4				
Dendrocygna viduata	White-faced Duck	LC (I)	LC	-	4	41.67			x
Dendrocygna bicolor	Fulvous Duck	LC (D)	LC	-	4				x
Netta erythrophthalma	Southern Pochard	LC (D)	LC	-	4				
Oxyura maccoa	Maccoa Duck	NT (D)	NT/NT	-	4				
Thalassornis leuconotus	White-backed Duck	LC (D)	LC	-	4				
Rallus caerulescens	African Rail	LC (U)	LC	-	4				
Crecopsis egregia	African Crake	LC (S)	LC (B)	-	4				
Amaurornis flavirostris	Black Crake	LC (U)	LC	-	4				x
Porphyrio porphyrio	African Purple Swamphen	LC (U)	LC	-	4				
Gallinula chloropus	Common Moorhen	LC (U)	LC	-	4				
Fulica cristata	Red-knobbed Coot	LC (D)	LC	-	4				x
Actophilornis africanus	African Jacana	LC (S)	LC	-	4				
Microparra capensis	Lesser Jacana	LC (U)	NT/LC	-	4				
Rostratula benghalensis	Greater Painted-snipe	LC (D)	VU/LC	-	4				
Charadrius pecuarius	Kittlitz's Plover	LC (U)	LC	-	4				
Charadrius tricollaris	Three-banded Plover	LC (U)	LC	-	2	33.33			x

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Vanellus coronatus	Crowned Lapwing	LC (I)	LC	-	1	83.33			x
Vanellus armatus	Blacksmith Lapwing	LC (I)	LC	-	2	75			x
Vanellus senegallus	African Wattled Lapwing	LC (S)	LC	-	2	25			
Gallinago nigripennis	African Snipe	LC (U)	LC	-	4				
Calidris ferruginea	Curlew Sandpiper	LC (I)	LC (NB)	-	4				
Calidris minuta	Little Stint	LC (D)	LC (NB)	-	4				
Philomachus pugnax	Ruff	LC (D)	LC (NB)	-	4				
Actitis hypoleucos	Common Sandpiper	LC (D)	LC (NB)	-	4				
Tringa stagnatilis	Marsh Sandpiper	LC (D)	LC (NB)	-	4				
Tringa nebularia	Common Greenshank	LC (S)	LC (NB)	-	4				
Tringa glareola	Wood Sandpiper	LC (S)	LC (NB)	-	3				x
Recurvirostra avosetta	Pied Avocet	LC (U)	LC	-	4				
Himantopus himantopus	Black-winged Stilt	LC (I)	LC	-	3				x
Anas querquedula	Garganey	LC (D)	LC (Vag)	-	4				
Anas platyrhynchos	Mallard	LC (D)	AL	-	4				
Anser anser	Goose, Domestic	-	Alien	-	1				
4. Large terrestrial birds									
Struthio camelus	Common Ostrich	LC (D)	LC	-	5				x
Sagittarius serpentarius	Secretarybird	**VU (D)**	**VU/VU**	**-**	3				
Francolinus coqui	Coqui Francolin	LC (S)	LC	-	2				x
Francolinus sephaena	Crested Francolin	LC (S)	LC	-	2	58.33			x
Francolinus shelleyi	Shelley's Francolin	LC (D)	LC	-	3				
Francolinus natalensis	Natal Spurfowl	LC (S)	LC	-	2				x
Francolinus swainsonii	Swainson's Spurfowl	LC (S)	LC	-	2	33.33			x
Coturnix coturnix	Common Quail	LC (D)	LC	-	2				
Coturnix delegorguei	Harlequin Quail	LC (S)	LC	-	2				
Numida meleagris	Helmeted Guineafowl	LC (S)	LC	-	1	33.33			x
Anthropoides paradiseus	Blue Crane	**VU (S)**	**NT/VU**	**PS**	3				
Eupodotis ruficrista	Red-crested Korhaan	LC (S)	LC	-	1	8.33			x
Burhinus capensis	Spotted Thick-knee	LC (S)	LC	-	2				x
Cursorius temminckii	Temminck's Courser	LC (S)	LC	-	1	16.67			
Afrotis afraoides	Northern Black Korhaan	-	LC	-	2				
5. Raptors									

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Gyps coprotheres	Cape Vulture	VU (D)	EN/VU	EN	3				
Falco biarmicus	Lanner Falcon	LC (I)	VU/LC	-	3				
Falco subbuteo	Eurasian Hobby	LC (D)	LC	-	3				
Falco amurensis	Amur Falcon	LC (S)	LC (NB)	-	2				
Falco vespertinus	Red-footed Falcon	NT (D)	NT/NT	-	3				
Falco rupicoloides	Greater Kestrel	LC (S)	LC	-	2				
Falco rupicolus	Rock Kestrel	-	LC	-	4				
Falco naumanni	Lesser Kestrel	LC (S)	-	-	2				
Aviceda cuculoides	African Cuckoo Hawk	LC (S)	LC	-	3				
Milvus migrans	Black Kite	LC (U)	LC (NB)	-	2				
Milvus aegyptius	Yellow-billed Kite	-	LC	-	2				x
Elanus caeruleus	Black-shouldered Kite	LC (S)	LC	-	1	50			x
Aquila verreauxii	Verreaux's Eagle	LC (S)	VU/LC	-	4				
Aquila rapax	Tawny Eagle	LC (S)	EN/LC	EN	3				
Aquila pomarina	Lesser Spotted Eagle	LC (U)	LC (B)	-	3				
Aquila wahlbergi	Wahlberg's Eagle	LC (S)	LC (B)	-	3	16.67			
Lophaetus occipitalis	Long-crested Eagle	LC (I)	LC	-	3				
Hieraaetus pennatus	Booted Eagle	LC (D)	LC (NB)	-	3				
Hieraaetus ayresii	Ayres Hawk-eagle	LC (S)	-	-	3				
Hieraaetus spilogaster	African Hawk Eagle	LC (D)	LC	-	3				
Kaupifalco monogrammicus	Lizard Buzzard	LC (S)	LC	-	2				
Circaetus cinereus	Brown Snake-eagle	LC (S)	LC	-	2	8.33			
Circaetus pectoralis	Black-chested Snake-eagle	LC (U)	LC	-	2				
Haliaeetus vocifer	African Fish-eagle	LC (S)	LC	-	2				x
Buteo rufofuscus	Jackal Buzzard	LC (S)	LC (N-End)	-	4				
Buteo buteo	Steppe Buzzard	LC (I)	LC (NB)	-	2	16.67			x
Accipiter ovampensis	Ovambo Sparrowhawk	LC (I)	LC	-	3				
Accipiter minullus	Little Sparrowhawk	LC (S)	LC	-	3				
Accipiter melanoleucus	Black Sparrowhawk	LC (D)	LC	-	3				
Accipiter badius	Shikra	LC (S)	LC	-	2	16.67			
Melierax gabar	Gabar Goshawk	LC (S)	LC	-	3				
Melierax canorus	Southern Pale Chanting Goshawk	LC (S)	LC	-	1				x

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN [3]	S.A. RED DATA [3]	S.A. NEM:BA [2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Circus ranivorus	African Marsh-harrier	LC (D)	EN/LC	-	3				
Polyboroides typus	African Harrier-hawk	LC (S)	LC	-	2				
6. Owls & nightjars									
Tyto alba	Barn Owl	LC (S)	LC	-	2				
Tyto capensis	African Grass-owl	LC (D)	VU/LC	-	4				
Asio capensis	Marsh Owl	LC (S)	LC	-	2				
Otus senegalensis	African Scops-owl	LC (S)	LC	-	3				
Glaucidium perlatum	Pearl-spotted Owlet	LC (S)	LC	-	2				x
Bubo africanus	Spotted Eagle-owl	LC (S)	LC	-	2				
Bubo lacteus	Verreaux's Eagle-owl	LC (S)	LC	-	3				
Caprimulgus pectoralis	Fiery-necked Nightjar	LC (S)	LC	-	2				
Caprimulgus tristigma	Freckled Nightjar	LC (S)	LC	-	2				
7. Sandgrouse, doves etc									
Pterocles bicinctus	Double-banded Sandgrouse	LC (D)	LC	-	2	8.33			
Columba guinea	Speckled Pigeon	LC (S)	LC	-	1	75			x
Columba arquatrix	African Olive-pigeon	LC (D)	LC	-	2				
Streptopelia semitorquata	Red-eyed Dove	LC (I)	LC	-	2	50			x
Streptopelia capicola	Cape Turtle Dove	LC (I)	LC	-	1	58.33			x
Streptopelia senegalensis	Laughing Dove	LC (S)	LC	-	2	100			x
Oena capensis	Namaqua Dove	LC (I)	LC	-	2	83.33			x
Turtur chalcospilos	Emerald-spotted Wood-dove	LC (S)	LC	-	2				x
Treron calvus	African Green-pigeon	LC (D)	LC	-	3				x
Poicephalus meyeri	Meyer's Parrot	LC (S)	LC	-	3				x
Corythaixoides concolor	Grey Go-away-bird	LC (S)	LC	-	1	91.67			x
Cuculus gularis	African Cuckoo	LC (S)	LC (B)	-	3	16.67			
Cuculus solitarius	Red-chested Cuckoo	LC (S)	LC (B)	-	2	58.33			x
Cuculus clamosus	Black Cuckoo	LC (S)	LC (B)	-	2	25			x
Clamator glandarius	Great Spotted Cuckoo	LC (S)	LC (B)	-	3	41.67			
Clamator levaillantii	Levaillant's Cuckoo	LC (S)	LC (B)	-	2	8.33			
Clamator jacobinus	Jacobin Cuckoo	LC (S)	LC (B)	-	2				
Chrysococcyx klaas	Klaas's Cuckoo	LC (S)	LC	-	2	25			

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL	S.A.	S.A.		PENTAD DATA (SABAP 2)			
		IUCN [3]	RED DATA [3]	NEM:BA [2]	LO	FP (RR%)	AP (RR%)	IR	SABAP1
Chrysococcyx caprius	Dideric Cuckoo	LC (S)	LC (B)	-	2	66.67			x
Columba livia	Rock Dove	LC (D)	**AL**	**-**	2	58.33			
Psittacula krameri	Rose-ringed Parakeet	LC (I)	AL	-	3				
Centropus superciliosus	White-browed Coucal	LC (S)	LC	-	4				
Centropus burchelli	Burchell's Coucal	LC (S)	LC	-	2	8.33			
8. Aerial feeders, etc									
Apus apus	Common Swift	LC (D)	LC (NB)	-	2				
Apus barbatus	African Black Swift	LC (S)	LC	-	2				
Apus caffer	White-rumped Swift	LC (I)	LC (B)	-	2	25			x
Apus horus	Horus Swift	LC (I)	LC	-	2				
Apus affinis	Little Swift	LC (I)	LC	-	2	16.67			x
Tachymarptis melba	Alpine Swift	LC (S)	LC (B)	-	2				
Cypsiurus parvus	Palm Swift	LC (I)	LC	-	4	41.67	100		
Colius striatus	Speckled Mousebird	LC (I)	LC	-	2	58.33			x
Colius colius	White-backed Mousebird	LC (I)	LC	-	2	33.33			x
Urocolius indicus	Red-faced Mousebird	LC (U)	LC	-	1	66.67			x
Ceryle rudis	Pied Kingfisher	LC (U)	LC	-	3	8.33			x
Megaceryle maxima	Giant Kingfisher	LC (D)	LC	-	4				x
Alcedo semitorquata	Half-collared Kingfisher	LC (D)	NT/LC	-	4				
Alcedo cristata	Malachite Kingfisher	LC (S)	LC	-	3				x
Ispidina picta	African Pygmy-kingfisher	LC (S)	LC	-	4				
Halcyon senegalensis	Woodland Kingfisher	LC (S)	LC (B)	-	4	16.67			
Halcyon albiventris	Brown-hooded Kingfisher	LC (S)	LC	-	2	41.67			x
Halcyon chelicuti	Striped Kingfisher	LC (S)	LC	-	4				x
Merops apiaster	European Bee-eater	LC (D)	LC (B/NB)	-	2	50			x
Merops persicus	Blue-cheeked Bee-eater	LC (S)	LC	-	2				
Merops nubicoides	Southern Carmine Bee-eater	LC (D)	LC	-	3				
Merops bullockoides	White-fronted Bee-eater	LC (I)	LC	-	1	33.33			
Merops pusillus	Little Bee-eater	LC (D)	LC	-	2				
Coracias caudatus	Lilac-breasted Roller	LC (S)	LC	-	1	50	100		x
Coracias naevia	Purple Roller	LC (D)	LC	-	3	16.67			

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Upupa africana	African Hoopoe	-	LC	-	2	33.33			x
Phoeniculus purpureus	Green Wood-hoopoe	LC (D)	LC	-	2	41.67			x
Rhinopomastus cyanomelas	Common Scimitarbill	LC (D)	LC	-	3				x
Tockus nasutus	African Grey Hornbill	LC (S)	LC	-	2	41.67			x
Tockus leucomelas	Southern Yellow-billed Hornbill	LC (D)	LC	-	1	50			x
Lybius torquatus	Black-collared Barbet	LC (D)	LC	-	2	58.33			x
Tricholaema leucomelas	Acacia Pied Barbet	LC (I)	LC	-	1	75			x
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC (S)	LC	-	2	33.33			x
Trachyphonus vaillantii	Crested Barbet	LC (D)	LC	-	2	66.67			x
Indicator indicator	Greater Honeyguide	LC (I)	LC	-	2				
Indicator minor	Lesser Honeyguide	LC (S)	LC	-	2	8.33			
Prodotiscus regulus	Brown-backed Honeybird	LC (I)	LC	-	3				x
Campethera abingoni	Golden-tailed Woodpecker	LC (S)	LC	-	2				
Dendropicos fuscescens	Cardinal Woodpecker	LC (S)	LC	-	2				x
Dendropicos namaquus	Bearded Woodpecker	LC (S)	LC	-	2	16.67			
Jynx ruficollis	Red-throated Wryneck	LC (I)	LC	-	2				
Hirundo rustica	Barn Swallow	LC (D)	LC (NB)	-	1	66.67			x
Hirundo albigularis	White-throated Swallow	LC (I)	LC	-	2	33.33			x
Hirundo dimidiata	Pearl-breasted Swallow	LC (S)	LC	-	2	66.67			x
Hirundo semirufa	Red-breasted Swallow	LC (I)	LC	-	2	66.67			x
Hirundo cucullata	Greater Striped-swallow	LC (I)	LC	-	2	33.33			x
Hirundo abyssinica	Lesser Striped-swallow	LC (I)	LC	-	2	50			x
Hirundo spilodera	South African Cliff-swallow	LC (I)	LC (B, N-End)	-	2				
Hirundo fuligula	Rock Martin	LC (S)	LC	-	4				
Delichon urbicum	Common House-martin	LC (D)	LC	-	3				
Riparia riparia	Sand Martin	LC (D)	LC (NB)	-	2				
Riparia paludicola	Brown-throated Martin	LC (D)	LC	-	2				
Riparia cincta	Banded Martin	LC (I)	LC	-	3				
Tockus damarensis	Damara Hornbill	-	LC	-	4				x
Tockus erythrorhynchus	Red-billed Hornbill	LC (S)	LC	-	3	16.67			x
Coracias garrulus	European Roller	**NT (D)**	**NT/NT**	-	2				

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
9. Cryptic & elusive insect-eaters									
Mirafra africana	Rufous-naped Lark	LC (D)	LC	-	2	58.33		1	
Mirafa africanoides	Fawn-coloured Lark	LC (S)	LC	-	2				
Mirafra sabota	Sabota Lark	LC (I)	LC	-	1	91.67			x
Mirafra rufocinnamomea	Flappet Lark	LC (D)	LC	-	2				
Chersomanes albofasciata	Spike-heeled Lark	LC (D)	LC	-	2				
Eremopterix leucotis	Chestnut-backed Sparrowlark	LC (S)	LC	-	2				
Eremopterix verticalis	Grey-backed Sparrowlark	LC (S)	LC	-	4				
Calandrella cinerea	Red-capped Lark	LC (I)	LC	-	2				
Pycnonotus nigricans	African Red-eyed Bulbul	LC (I)	LC	-	4				
Pycnonotus tricolor	Dark-capped Bulbul	-	LC	-	2	91.67			x
Sylvia borin	Garden Warbler	LC (D)	LC	-	2				
Hippolais icterina	Icterine Warbler	LC (D)	LC (NB)	-	4				
Hippolais olivetorum	Olive-tree Warbler	LC (S)	LC (NB)	-	3	16.67			
Phylloscopus trochilus	Willow Warbler	LC (D)	LC (NB)	-	3	16.67			
Eremomela icteropygialis	Yellow-bellied Eremomela	LC (S)	LC	-	2				x
Eremomela usticollis	Burnt-necked Eremomela	LC (S)	LC	-	2	41.67			x
Acrocephalus arundinaceus	Great Reed-warbler	LC (D)	LC (NB)	-	4	8.33			
Acrocephalus gracilirostris	Lesser Swamp-warbler	LC (S)	LC	-	4				x
Acrocephalus baeticatus	African Reed-warbler	-	LC (B)	-	4				
Acrocephalus palustris	Marsh Warbler	LC (I)	LC (NB)	-	4	8.33			
Acrocephalus schoenobaenus	Sedge Warbler	LC (D)	LC (NB)	-	4				x
Bradypterus baboecala	Little Rush-warbler	LC (S)	LC	-	4				
Calamonastes fasciolatus	Barred Wren-warbler	LC (S)	LC	-	1	16.67			
Sphenoeacus afer	Cape Grassbird	LC (D)	LC (N-End)	-	3				
Sylvietta rufescens	Long-billed Crombec	LC (S)	LC	-	2	100			x
Apalis thoracica	Bar-throated Apalis	LC (S)	LC	-	2				
Camaroptera brachyura	Green-backed Camaroptera	LC (I)	LC	-	4				
Camaroptera brevicaudata	Grey-backed Camaroptera	-	LC	-	2	16.67			
Cisticola juncidis	Zitting Cisticola	LC (I)	LC	-	2	33.33			x
Cisticola aridulus	Desert Cisticola	LC (I)	LC	-	2	25			

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Cisticola textrix	Cloud Cisticola	LC (D)	LC (N-End)	-	2				
Cisticola ayresii	Wing-snapping Cisticola	LC (D)	LC	-	2				
Cisticola fulvicapilla	Neddicky	LC (S)	LC	-	2	75			x
Cisticola lais	Wailing Cisticola	LC (S)	LC	-	2				
Cisticola chiniana	Rattling Cisticola	LC (S)	LC	-	1	91.67			x
Cisticola tinniens	Le Vaillant's Cisticola	LC (S)	LC	-	4				
Cisticola aberrans	Lazy Cisticola	LC (S)	LC	-	3				
Prinia subflava	Tawny-flanked Prinia	LC (S)	LC	-	2	66.67			x
Prinia flavicans	Black-chested Prinia	LC (S)	LC	-	1	83.33			x
Motacilla aguimp	African Pied Wagtail	LC (S)	LC	-	3				
Motacilla capensis	Cape Wagtail	LC (S)	LC	-	2	25			x
Motacilla flava	Yellow Wagtail	LC (D)	LC	-	4				
Anthus cinnamomeus	African Pipit	LC (S)	LC	-	1	41.67			x
Anthus similis	Long-billed Pipit	LC (S)	LC	-	4				
Anthus leucophrys	Plain-backed Pipit	LC (S)	LC	-	3				
Anthus vaalensis	Buffy Pipit	LC (I)	LC	-	3				
Anthus lineiventris	Striped Pipit	LC (S)	LC	-	4				
Macronyx capensis	Cape Longclaw	LC (S)	LC	-	2				
Mirafra fasciolata	Eastern Clapper Lark	-	LC	-	2				
Certhilauda semitorquata	Eastern Long-billed Lark	LC (D)	LC (N-End)	-	4				
10. Regular insect-eaters									
Campephaga flava	Black Cuckooshrike	LC (S)	LC	-	2				x
Parus cinerascens	Ashy Tit	LC (S)	LC	-	2	16.67			
Dicrurus adsimilis	Fork-tailed Drongo	LC (S)	LC	-	1	100			x
Oriolus oriolus	Eurasian Golden-oriole	LC (S)	LC	-	3				
Oriolus larvatus	Black-headed Oriole	LC (I)	LC	-	2				x
Corvus albus	Pied Crow	LC (S)	LC	-	1	100	100		x
Corvus capensis	Cape Crow	LC (I)	LC	-	3				
Parus niger	Southern Black Tit	LC (S)	LC	-	2				x
Anthoscopus caroli	Grey Penduline-tit	LC (D)	LC	-	4				
Anthoscopus minutus	Cape Penduline-tit	LC (S)	LC	-	2	16.67			x

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Turdoides jardineii	Arrow-marked Babbler	LC (S)	LC	-	2	25			x
Turdoides bicolor	Southern Pied-babbler	LC (D)	LC	-	2	8.33			
Turdus libonyanus	Kurrichane Thrush	LC (U)	LC	-	2				x
Psophocichla litsipsirupa	Groundscraper Thrush	LC (U)	LC	-	2				x
Monticola rupestris	Cape Rock-thrush	LC (S)	LC (N-End)	-	4				x
Monticola brevipes	Short-toed Rock-thrush	LC (S)	LC	-	4				x
Oenanthe monticola	Mountain Wheatear	LC (S)	LC	-	4				
Cercomela familiaris	Familiar Chat	LC (S)	LC	-	2				x
Thamnolaea cinnamomeiventris	Mocking Cliff-chat	LC (S)	LC	-	4				x
Myrmecocichla formicivora	Anteating Chat	LC (S)	LC	-	4				
Saxicola torquatus	African Stonechat	LC (S)	LC	-	2				x
Cossypha caffra	Cape Robin-chat	LC (S)	LC	-	2				x
Cossypha humeralis	White-throated Robin-chat	LC (S)	LC	-	2	16.67			x
Erythropygia paena	Kalahari Scrub-robin	LC (S)	LC	-	1	83.33	100		x
Erythropygia leucophrys	White-browed Scrub-robin	LC (S)	LC	-	2	50			x
Sylvia communis	Common Whitethroat	LC (D)	LC (NB)	-	4				
Muscicapa striata	Spotted Flycatcher	LC (D)	LC (NB)	-	2	66.67			x
Myioparus plumbeus	Grey Tit-flycatcher	LC (S)	LC	-	3				x
Parisoma subcaeruleum	Chestnut-vented Tit-babbler	-	LC	-	1	91.67			x
Bradornis mariquensis	Marico Flycatcher	LC (S)	LC	-	1	100			x
Bradornis pallidus	Pale Flycatcher	LC (S)	LC	-	2				
Melaenornis pammelaina	Southern Black-flycatcher	LC (S)	LC	-	2				x
Sigelus silens	Fiscal Flycatcher	LC (S)	LC (N-End)	-	2				x
Batis molitor	Chinspot Batis	LC (S)	LC	-	2	58.33			x
Stenostira scita	Fairy Flycatcher	LC (S)	LC (N-End)	-	3				x
Terpsiphone viridis	African Paradise-flycatcher	LC (S)	LC	-	2	8.33			x
Lanius minor	Lesser Grey Shrike	LC (D)	LC (NB)	-	2	50			x
Lanius collaris	Common Fiscal	LC (I)	LC	-	2	8.33			x
Lanius collurio	Red-backed Shrike	LC (D)	LC (NB)	-	2	50			x
Laniarius ferrugineus	Southern Boubou	LC (S)	LC	-	2	50			x

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN[3]	S.A. RED DATA[3]	S.A. NEM:BA[2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Laniarius atrococcineus	Crimson-breasted Shrike	LC (I)	LC	-	1	83.33			x
Dryoscopus cubla	Black-backed Puffback	LC (D)	LC	-	2	16.67			x
Tchagra australis	Brown-crowned Tchagra	LC (S)	LC	-	1	50			x
Tchagra senegalus	Black-crowned Tchagra	LC (S)	LC	-	2	16.67			x
Telophorus sulfureopectus	Orange-breasted Bush-shrike	LC (S)	LC	-	3				
Telophorus zeylonus	Bokmakierie	LC (S)	LC	-	2				
Malaconotus blanchoti	Grey-headed Bush-shrike	LC (I)	LC	-	2				
Corvinella melanoleuca	Magpie Shrike	LC (D)	LC	-	1	91.67	100		x
Prionops plumatus	White-crested Helmet-shrike	LC (S)	LC	-	2				x
Nilaus afer	Brubru	LC (S)	LC	-	1				x
Acridotheres tristis	Common Myna	LC (I)	**AL**	**-**	1	100			
Creatophora cinerea	Wattled Starling	LC (S)	LC	-	2	50			
Cinnyricinclus leucogaster	Violet-backed Starling	LC (D)	LC	-	2				x
Lamprotornis nitens	Cape Glossy Starling	LC (S)	LC	-	1	83.33			x
Lamprotornis australis	Burchell's Starling	LC (U)	LC	-	2	25			x
Onychognathus morio	Red-winged Starling	LC (I)	LC	-	3				x
Spreo bicolor	Pied Starling	LC (S)	LC (N-End)	-	3				
Turdus smithi	Karoo Thrush	-	LC (N-End)	-	2	33.33			x
Turdus olivaceus	Olive Thrush	LC (U)	LC	-	4				x
11. Oxpeckers & nectar feeders									
Nectarinia famosa	Malachite Sunbird	LC (S)	LC	-	4				
Nectarinia mariquensis	Marico Sunbird	LC (S)	LC	-	2	75			x
Nectarinia afer	Greater Double-collared Sunbird	LC (S)	LC (N-End)	-	2				x
Nectarinia talatala	White-bellied Sunbird	LC (S)	LC	-	1	66.67			x
Nectarinia amethystina	Amethyst Sunbird	LC (S)	LC	-	1	50			x
Zosterops pallidus	Orange River White-eye	LC (U)	LC	-	4				x
Zosterops capensis	Cape White-eye	-	LC (N-End)	-	2	25			x
12. Seed-eaters									

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL	S.A.	S.A.		PENTAD DATA (SABAP 2)			
		IUCN [3]	RED DATA [3]	NEM:BA [2]	LO	FP (RR%)	AP (RR%)	IR	SABAP1
Bubalornis niger	Red-billed Buffalo-weaver	LC (S)	LC	-	3	16.67			x
Plocepasser mahali	White-browed Sparrow-weaver	LC (S)	LC	-	1	58.33	100		x
Passer domesticus	House Sparrow	LC (D)	**AL**	**-**	2	50			x
Passer motitensis	Great Sparrow	LC (S)	LC	-	1	41.67			
Passer melanurus	Cape Sparrow	LC (S)	LC	-	2	75			x
Petronia superciliaris	Yellow-throated Petronia	LC (S)	LC	-	3				
Sporopipes squamifrons	Scaly-feathered Finch	LC (S)	LC	-	1	100	100		x
Ploceus intermedius	Lesser Masked Weaver	LC (S)	LC	-	2				
Anaplectes rubriceps	Red-headed Weaver	LC (S)	LC	-	3				x
Ploceus cucullatus	Village Weaver	LC (S)	LC	-	2	25			
Ploceus capensis	Cape Weaver	LC (S)	LC (N-End)	-	2				
Ploceus velatus	Southern Masked-weaver	LC (S)	LC	-	1	100			x
Amblyospiza albifrons	Thick-billed Weaver	LC (S)	LC	-	4				
Quelea quelea	Red-billed Quelea	LC (S)	LC	-	2	41.67			x
Euplectes orix	Southern Red Bishop	LC (S)	LC	-	2	33.33			x
Euplectes capensis	Yellow Bishop	LC (S)	LC	-	4				
Euplectes afer	Yellow-crowned Bishop	LC (S)	LC	-	2	8.33			x
Euplectes ardens	Red-collared Widowbird	LC (S)	LC	-	4				
Euplectes albonotatus	White-winged Widowbird	LC (S)	LC	-	3	33.33			x
Euplectes progne	Long-tailed Widowbird	LC (S)	LC	-	2	8.33			x
Amadina erythrocephala	Red-headed Finch	LC (S)	LC	-	2				
Amadina fasciata	Cut-throat Finch	LC (S)	LC	-	2	8.33			x
Spermestes cucullatus	Bronze Mannikin	LC (S)	LC	-	2				
Pytilia melba	Green-winged Pytilia	LC (S)	LC	-	1	25			x
Lagonosticta rubricata	African Firefinch	LC (S)	LC	-	3				
Lagonosticta rhodopareia	Jameson's Firefinch	LC (S)	LC	-	2				
Lagonosticta senegala	Red-billed Firefinch	LC (S)	LC	-	2				x
Amandava subflava	Orange-breasted Waxbill	LC (S)	LC	-	2				
Uraeginthus angolensis	Blue Waxbill	LC (S)	LC	-	1	100			x
Granatina granatina	Violet-eared Waxbill	LC (S)	LC	-	1				x
Estrilda erythronotos	Black-faced Waxbill	LC (S)	LC	-	2	16.67			
Estrilda astrild	Common Waxbill	LC (S)	LC	-	2	8.33			x

CATEGORY [1] & SPECIES [4]	COMMON NAME [4]	CONSERVATION STATUS				ATLAS[4]			
		GLOBAL IUCN [3]	S.A. RED DATA [3]	S.A. NEM:BA [2]	LO	PENTAD DATA (SABAP 2) FP (RR%)	AP (RR%)	IR	SABAP1
Ortygospiza atricollis	African Quailfinch	LC (S)	LC	-	1	25			
Vidua macroura	Pin-tailed Whydah	LC (S)	LC	-	2	33.33			x
Vidua regia	Shaft-tailed Whydah	LC (S)	LC	-	1	33.33			x
Vidua funerea	Dusky Indigobird	LC (S)	LC	-	2				
Vidua chalybeata	Village Indigobird	LC (S)	LC	-	1	16.67			
Vidua paradisaea	Long-tailed Paradise-whydah	LC (S)	LC	-	1	33.33			x
Anomalospiza imberbis	Cuckoo Finch	LC (S)	LC	-	2				
Crithagra mozambicus	Yellow-fronted Canary	LC (D)	LC	-	1	58.33			x
Crithagra atrogularis	Black-throated Canary	LC (S)	LC	-	1	83.33			x
Crithagra gularis	Streaky-headed Seedeater	LC (S)	LC	-	2				
Emberiza tahapisi	Cinnamon-breasted Bunting	LC (S)	LC	-	1				x
Emberiza capensis	Cape Bunting	LC (S)	LC	-	2				x
Emberiza flaviventris	Golden-breasted Bunting	LC (S)	LC	-	2	16.67			x
Passer griseus	Northern Grey-headed Sparrow	LC (S)	LC	-	2				x
Passer diffusus	Southern Greyheaded Sparrow	LC (S)	LC	-	2	91.67			x

Key

Status: D = Declining; EN = Endangered; I = Increasing; LC = Least Concern; NB = Non-breeding; NR = Not Recognised by Birdlife International; NT = Near Threatened; PS = Protected Species; S = Stable; U = Unknown population trend; VU = Vulnerable

Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate; 4 = Low; 5 = Restricted to managed populations

Sources: [1]Newman (2002); [2]ToPS List (2015); [3]IUCN (2013.1); [4]SABAP(2016); [5]Taylor (2015)

12.4. Appendix 4 Present and potentially occurring reptile species

SPECIES [1]	COMMON NAME [1]	CONSERVATION STATUS				
		GLOBAL IUCN [3]	S.A. RED DATA [1]	S.A. NEM:BA [2]	LO1,4	ATLAS
PELOMEDUSIDAE (Terrapins)						
Pelomedusa subrufa	Marsh Terrapin	-	2LC	-	3	
Pelusios sinuatus	Serrated Hinged Terrapin	-	2LC	-	4	
TESTUDINIDAE (Tortoises)						
Kinixys lobatsiana	Lobatse Hinged Tortoise	-	1LC	-	2	
Stigmochelys pardalis	Leopard Tortoise	-	1LC	-	2	
GEKKONIDAE (Geckos)						
Hemidactylus mabouia	Common Tropical House Gecko	-	2LC	-	2	
Lygodactylus capensis capensis	Common Dwarf Gecko	-	1LC	-	2	1
Pachydactylus affinis	Transvaal Gecko	-	1LC (End)	-	2	
Pachydactylus capensis	Cape Gecko	-	2LC	-	2	
LACERTIDAE (Typical lizards)						
Ichnotropis capensis	Ornate Rough-scaled Lizard	-	1LC	-	3	
Meroles squamulosus	Savanna Lizard	-	1LC	-	2	
Nucras holubi	Holub's Sandveld Lizard	-	2LC	-	2	
Nucras intertexta	Spotted Sandveld Lizard	-	2LC	-	2	1
CORDYLIDAE (Girdled lizards & relatives)						
Cordylus jonesii	Jones' Girdled Lizard	-	1LC	-	2	
Cordylus vittifer	Common Girdled Lizard	-	1LC	-	4	
GERRHOSAURIDAE (Plated lizards & relatives)						
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	-	2LC	-	2	1
SCINCIDAE (Skinks)						
Acontias gracilicauda	Thin-tailed Legless Skink	LC (U)	1LC (End)	-	3	
Afroablepharus wahlbergii	Wahlberg's Snake-eyed Skink	-	2LC	-	3	
Mochlus sundevallii	Sundevall's Writhing Skink	LC (S)	2LC	-	2	
Trachylepis capensis	Cape Skink	-	2LC	-	2	
Trachylepis punctatissima	Speckled Rock Skink	LC (S)	2LC	-	2	1
Trachylepis varia	Variable Skink	-	2LC	-	2	1
VARANIDAE (Monitors)						
Varanus albigularis albigularis	Southern Rock Monitor	-	2LC	-	2	
Varanus niloticus	Nile Monitor	-	2LC	-	4	1
CHAMAELEONIDAE (Chamaeleons)						
Chamaeleo dilepis	Common Flap-neck Chameleon	LC (S)*	2LC	-	2	
AGAMIDAE (Agamas)						
Agama aculeata distanti	Eastern Ground Agama	-	1LC (End)	-	2	
Agama atra	Southern Rock Agama	-	1LC	-	4	
Acanthocercus atricollis atricollis	Southern Tree Agama	LC (S)*	1LC	-	2	
TYPHLOPIDAE (Blind snakes)						
Afrotyphlops bibronii	Bibron's Blind Snake	-	1LC	-	2	
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	-	2LC	-	2	
LEPTOTYPHLOPIDAE (Thread snakes)						
Leptotyphlops distanti	Distant's Thread Snake	-	1LC	-	3	
Leptotyphlops incognitus	Incognito Thread Snake	-	1LC	-	3	
Leptotyphlops scutifrons	Peters' Thread Snake	-	1LC	-	2	

SPECIES [1]	COMMON NAME [1]	CONSERVATION STATUS				
		GLOBAL IUCN [3]	S.A. RED DATA [1]	S.A. NEM:BA [2]	- 4	
PYTHONIDAE (Python)						
Python natalensis	Southern African Python	-	2LC	**PS**	2	
VIPERIDAE (Adders)						
Bitis arietans arietans	Puff Adder	-	2LC	-	2	
Bitis caudalis	Horned Adder	-	2LC	-	4	
Causus rhombeatus	Rhombic Night Adder	-	2LC	-	2	
LAMPROPHIIDAE (Advanced snakes)						
Aparallactus capensis	Black-headed Centipede-eater	LC (S)	2LC	-	2	
Atractaspis bibronii	Bibron's Stiletto Snake	-	2LC	-	2	
Homoroselaps dorsalis	Striped Harlequin Snake	**NT**	1LC (End)	-	3	
Boaedon capensis	Common House Snake	-	2LC	-	2	
Lamprophis aurora	Aurora Snake	LC (D)	1LC (End)	-	2	
Lycodonomorphus rufulus	Brown Water Snake	-	1LC	-	2	
Lycophidion capense capense	Cape Wolf Snake	-	2LC	-	2	
Psammophis brevirostris	Short-snouted Grass Snake	-	1LC	-	2	
Psammophis crucifer	Cross-marked Grass Snake	-	1LC	-	2	
Psammophis subtaeniatus	Western yellow-bellied Sand Snake	LC (S)	2LC	-	3	
Psammophylax rhombeatus rhombeatus	Spotted Grass Snake	-	2LC	-	3	
Psammophylax tritaeniatus	Striped Grass Snake	LC (S)	2LC	-	2	
Duberria lutrix lutrix	South African Slug-eater	LC (S)	1LC (End)	-	2	
Prosymna sundevallii	Sundevall's Shovel-snout	-	1LC	-	3	
Pseudaspis cana	Mole Snake	-	2LC	-	2	
ELAPIDAE (Cobras & relatives)						
Elapsoidea sundevallii	Sundevall's Garter Snake	-	1LC	-	2	
Hemachatus haemachatus	Rinkhals	LC (S)	1LC	-	2	
Naja annulifera	Snouted Cobra	-	2LC	-	2	
Naja mossambica	Mozambique Spitting Cobra	-	2LC	-	2	
COLUBRIDAE (Typical snakes)						
Crotaphopeltis hotamboeia	Red-lipped Snake	-	2LC	-	2	
Dasypeltis scabra	Rhombic Egg-eater	LC (U)	2LC	-	2	
Dispholidus typus	Boomslang	-	2LC	-	2	
Philothamnus hoplogaster	South-eastern Green Snake	-	2LC	-	3	
Philothamnus semivariegatus	Spotted Bush Snake	-	2LC	-	2	
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake	-	2LC	-	2	
Thelotornis capensis capensis	Southern Twig Snake	-	1LC	-	3	
	Key					
Status: 1 = Global; 2 = Regional; LC = Least Concern; NT = Near-threatened; PS = Protected Species						
Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate; 4: Low; 5 = May occur as a managed population						
Sources: [1]Bates *et al*. (2014); [2]ToPS List (2015); [3]IUCN (2015.4); [4]ReptileMap (2016)						

12.5. Appendix 5 Present and potentially occurring frog species

FAMILY [1,4] & SPECIES [4]	COMMON NAME [3]	CONSERVATION STATUS			LoO [3,5]	ATLAS (N) [3,5]
		GLOBAL IUCN [2]	S.A. RED DATA [3]	S.A. NEM:BA [1]		
BREVICIPITIDAE (Rain frogs)						
Breviceps adspersus adspersus	Bushveld Rain Frog	LC (U)*	LC	-	2	
BUFONIDAE (Toads)						
Sclerophrys garmani	Eastern Olive Toad	LC (U)	LC	-	2	
Sclerophrys gutturalis	Guttural Toad	LC (I)	LC	-	2	
Poyntonophrynus fenoulheti	Northern Pygmy Toad	LC (U)	LC	-	2	1
Schismaderma carens	Red Toad	LC (U)	LC	-	2	2
HYPEROLIIDAE (Leaf-folding & reed frogs)						
Kassina senegalensis	Bubbling Kassina	LC (U)	LC	-	2	5
MICROHYLIDAE (Rubber frogs)						
Phrynomantis bifasciatus	Banded Rubber Frog	LC (U)	LC	-	2	2
Phrynobatrachus natalensis	Snoring Puddle Frog	LC (S)	LC	-	2	2
PTYCHADENIDAE (Grass frogs)						
Ptychadena anchietae	Plain Grass Frog	LC (U)	LC	-	2	3
Ptychadena mossambica	Broad-banded Grass Frog	LC (U)	LC	-	2	2
PIPIDAE (African clawed frogs)						
Xenopus laevis	Common Platanna	LC (I)	LC	-	4	
PYXICEPHALIDAE (River, stream, moss & sand frogs)						
Cacosternum boettgeri	Boettger's Caco	LC (U)	LC	-	2	4
Amietia quecketti	Queckett's River Frog	LC (S)	LC	-	2	1
Amietia fuscigula	Cape River Frog	LC (S)	LC	-	4	
Pyxicephalus adspersus	Giant Bullfrog	LC (D)	NT	PS	2	
Pyxicephalus edulis	African Bullfrog	LC (U)	LC	PS	4	
Tomopterna sp.	Sand frog	-	-	-	1	
Tomopterna cryptotis	Tremolo Sand Frog	LC (S)	LC	-	2	
Tomopterna natalensis	Natal Sand Frog	LC (U)	LC	-	2	2
Tomopterna tandyi	Tandy's Sand Frog	LC (U)	LC	-	2	
RHACOPHORIDAE (Foam nest frogs)						
Chiromantis xerampelina	Southern Foam Nest Frog	LC (U)	LC	-	4	
Key						
Status: LC = Least Concern; NT = Near Threatened; PS = Protected Species						
Likelihood of Occurrence (LO): 1 = Present; 2 = High; 4 = Low						
Sources: [1]ToPS List (2007); [2]IUCN (2013.1); [3]Minter et al. (2004); [4]Du Preez & Carruthers (2009); [5]FrogMap (2016)						

12.6. Appendix 6 Present and potentially occurring butterfly species

SPECIES[1]	COMMON NAME[1]	STATUS[1]	LO[1,2]	ATLAS[1,2]
HESPERIIDAE (Sandmen, skippers, policemen & sylphs)				
Abantis tettensis	Spotted Paradise Skipper	1LC	3	
Caprona pillaana	Ragged Skipper	1LC	3	
Coeliades pisistratus	Two-pip Policeman	1LC	3	
Gegenes niso niso	Common hottentot	1LC	2	1
Gegenes pumilio gambica	Dark hottentot	1LC	2	
Gomalia elma elma	Green-marbled Skipper	1LC	3	
Leucochitonea levubu	White-cloaked Skipper	1LC	3	
Metisella meninx	Marsh Sylph	1LC(RHS)	4	
Pelopidas thrax	White-banded Swift	1LC	3	
Platylesches ayresii	Peppered Hopper	1LC	3	
Platylesches neba	Flower-girl Hopper	1LC	2	
Sarangesa motozi	Forest Elfin	1LC	3	
Sarangesa phidyle	Small elfin	1LC	2	2
Sarangesa seineri seineri	Northern Dark Elfin	1LC	3	
Spialia delagoae	Delagoa sandman	1LC	2	
Spialia diomus ferax	Common sandman	1LC	2	1
Spialia spio	Mountain sandman	1LC	2	
PAPILIONIDAE (Swallowtails, swordtails & handkerchiefs)				
Papilio demodocus demodocus	Citrus swallowtail	1LC	2	1
Papilio nireus lyaeus	Green-banded swallowtail	1LC	3	
PIERIDAE (Whites, tips & travellers)				
Belenois aurota	Brown-veined white	1LC	1	2
Belenois creona severina	African common white	1LC	2	
Catopsilia florella	African migrant	1LC	1	3
Colias electo electo	African clouded yellow	1LC	2	
Colotis annae annae	Scarlet tip	1LC	3	
Colotis antevippe gavisa	Red tip	1LC	1	
Colotis euippe omphale	Smoky orange tip	1LC	2	1
Colotis evagore antigone	Small orange tip	1LC	2	
Colotis evenina evenina	Orange tip	1LC	2	
Colotis pallene	Bushveld orange tip	1LC	2	
Colotis regina	Queen purple tip	1LC	3	
Colotis vesta argillaceus	Veined Arab	1LC	2	
Eurema brigitta brigitta	Broad-bordered grass yellow	1LC	1	5
Mylothris agathina agathina	Common dotted border	1LC	2	3
Mylothris rueppellii haemus	Twin dotted border	1LC	4	
Pinacopteryx eriphia eriphia	Zebra white	1LC	1	1
Pontia helice helice	Common meadow white	1LC	2	
Teracolus agoye agoye	Speckled sulphur tip	1LC	3	
Teracolus eris eris	Banded gold tip	1LC	2	
Teracolus subfasciatus	Lemon traveller	1LC	2	
NYMPHALIDAE (Acraeas, monarchs, pansies, browns, ringlets & charaxes)				
Acraea aglaonice	Window Acraea	1LC	2	
Acraea anemosa	Broad-bordered acraea	1LC	2	
Acraea axina	Little acraea	1LC	2	1
Acraea barberi	Barber's acraea	1LC	3	
Acraea caldarena caldarena	Black-tipped acraea	1LC	3	
Acraea horta	Garden acraea	1LC	2	
Acraea natalica	Natal acraea	1LC	3	
Acraea neobule neobule	Wandering donkey acraea	1LC	1	1
Acraea oncaea	Rooibok Acraea	1LC	3	1

SPECIES[1]	COMMON NAME[1]	STATUS[1]	LO[1,2]	ATLAS[1,2]
Byblia ilithyia	Spotted joker	1LC	1	3
Catacroptera cloanthe cloanthe	Pirate	1LC	2	
Charaxes achaemenes achaemenes	Bushveld charaxes	1LC	2	
Charaxes brutus natalensis	White-barred charaxes	1LC	3	
Charaxes candiope	Green-veined charaxes	1LC	3	
Charaxes jahlusa rex	Pearl-spotted charaxes	1LC	2	
Charaxes jasius saturnus	Foxy charaxes	1LC	2	1
Charaxes vansoni	Van Son's charaxes	1LC	2	
Coenyropsis natalii natalii	Natal brown	1LC	2	2
Danaus chrysippus orientis	African monarch	1LC	1	3
Hamanumida daedalus	Guinea-fowl butterfly	1LC	2	1
Heteropsis perspicua perspicua	Eyed bush brown	1LC	2	
Hypolimnas misippus	Common diadem	1LC	1	1
Junonia hierta cebrene	Yellow pansy	1LC	1	3
Junonia oenone oenone	Blue pansy	1LC	1	1
Junonia orithya madagascariensis	Eyed pansy	1LC	2	2
Melanitis leda	Twilight brown	1LC	4	
Neptis saclava marpessa	Spotted sailer	1LC	4	
Paternympha narycia	Spotted-eye brown	1LC	3	
Phalanta phalantha aethiopica	African Leopard	1LC	3	
Physcaeneura panda	Dark-webbed ringlet	1LC	2	4
Precis archesia archesia	Garden commodore	1LC	2	
Precis octavia sesamus	Gaudy Commodore	1LC	4	
Stygionympha wichgrafi wichgrafi	Wichgraf's hillside brown	1LC	4	
Telchinia burni	Pale-yellow acraea	1LC	3	
Telchinia rahira rahira	Marsh acraea	1LC	2	
Telchinia serena	Dancing acraea	1LC	2	1
Vanessa cardui	Painted lady	1LC	1	1
Ypthima asterope asterope	African ringlet	1LC	3	
Ypthima impura paupera	Impure ringlet	1LC	3	
LYCAENIDAE (Coppers, blues & relatives)				
Actizera lucida	Rayed blue	1LC	3	
Alaena amazoula amazoula	Yellow zulu	1LC	3	
Aloeides damarensis damarensis	Damara copper	1LC	3	
Aloeides taikosama	Dusky copper	1LC	2	2
Anthene amarah amarah	Black striped hairtail	1LC	1	2
Anthene definita definita	Common hairtail	1LC	2	
Anthene livida livida	Pale hairtail	1LC	2	
Anthene millari	Millar's hairtail	1LC	3	
Anthene otacilia otacilia	Otacilia hairtail	1LC	3	1
Axiocerses amanga amanga	Bush scarlet	1LC	2	
Axiocerses tjoane tjoane	Eastern scarlet	1LC	2	
Azanus jesous	Topaz babul blue	1LC	2	2
Azanus moriqua	Black-bordered babul blue	1LC	2	1
Azanus ubaldus	Velvet-spotted babul blue	1LC	2	
Cacyreus marshalli	Common geranium bronze	1LC	3	
Cacyreus virilis	Mocker bronze	1LC	3	
Chilades trochylus	Grass jewel	1LC	1	1
Cigaritis ella	Ella's bar	1LC	2	1
Cigaritis mozambica	Mozambique bar	1LC	3	
Cigaritis natalensis	Natal bar	1LC	2	
Cigaritis phanes	Silvery bar	1LC	3	
Cnodontes penningtoni	Pennington's buff	1LC	3	
Crudaria leroma	Silver spotted grey	1LC	3	

SPECIES[1]	COMMON NAME[1]	STATUS[1]	LO[1,2]	ATLAS[1,2]
Cupidopsis jobates jobates	Tailed meadow blue	1LC	2	
Eicochrysops messapus mahallakoaena	Cupreous blue	1LC	2	1
Euchrysops malathana	Common smoky blue	1LC	3	
Hypolycaena philippus philippus	Purplebrown hairstreak	1LC	3	
Iolaus mimosae rhodosense	Mimosa sapphire	1LC	3	
Iolaus trimeni	Trimen's sapphire	1LC	2	1
Lachnocnema bibulus	Common woolly legs	1LC	3	
Lampides boeticus	Pea blue	1LC	2	3
Lepidochrysops glauca	Silvery blue	1LC	2	
Lepidochrysops patricia	Patricia blue	1LC	2	
Lepidochrysops plebeia plebeia	Twin-spot blue	1LC	2	
Leptomyrina henningi henningi	Henning's black-eye	1LC	2	
Leptotes pirithous pirithous	Common zebra blue	1LC	2	2
Myrina silenus ficedula	Common fig tree blue	1LC	4	
Pseudonacaduba sichela sichela	Dusky blue	1LC	2	
Stugeta bowkeri tearei	Bowker's marbled sapphire	1LC	2	
Tarucus sybaris sybaris	Dotted blue	1LC	2	2
Tuxentius calice	White pie	1LC	3	
Tuxentius melaena melaena	Black pie	1LC	2	1
Uranothauma nubifer nubifer	Black heart	1LC	3	
Virachola antalus	Brown playboy	1LC	2	1
Virachola dinochares	Apricot playboy	1LC	2	
Zintha hintza hintza	Hintza pierrot	1LC	2	
Zizeeria knysna knysna	Sooty blue	1LC	2	2
Zizula hylax	Gaika blue	1LC	1	3
Key				
Status: LC = Least Concern; RHS = Rare Habitat Specialist; RLD = Rare Low Density; 1 = Global				
Likelihood of Occurrence (LO): 1 = Present; 2 = High; 3 = Moderate; 4 = Low				
Sources: [1]Mecenero *et al*. (2013); [2]LepiMap (2016)				

12.7. Appendix 7 Present and potentially occurring odonata species

SPECIES[1]	COMMON NAME[1]	DBI[1]	LO[1]	ATLAS[2]
COENAGRIONIDAE (Pond damsels)				
Ceriagrion glabrum	Common Citril	0	3	
Pseudagrion salisburyense	Slate Sprite	1	4	
AESHNIDAE (Hawkers)				
Anax ephippiger	Vagrant Emperor	2	2	
GOMPHIDAE (Clubtails)				
Ictinogomphus ferox	Common Tigertail	2	3	
Ceratogomphus pictus	Common Thorntail	2	3	
LIBELLULIDAE (Skimmers & relatives)				
Orthetrum julia	Julia Skimmer	1	3	
Palpopleura lucia	Lucia Widow	2	3	
Crocothemis sanguinolenta	Little Scarlet	3	3	
Brachythemis leucosticta	Banded Groundling	2	2	
Sympetrum fonscolombii	Nomad	0	2	
Trithemis annulata	Violet Dropwing	1	3	
Trithemis arteriosa	Red-veined Dropwing	0	3	
Trithemis furva	Navy Dropwing	0	3	
Trithemis kirbyi	Kirby's Dropwing	0	1	
Trithemis stictica	Jaunty Dropwing	1	3	
Rhyothemis semihyalina	Phantom Flutterer	1	3	
Pantala flavescens	Pantala	0	3	
Tramea basilaris	Keyhole Glider	0	2	
Key				
Likelihood of Occurrence (LO): 2 = High; 3 = Moderate; 4 = Low				
Dragonfly Biotic Index (DBI): An index developed by Samways (2008) based on three criteria: geographical distribution, conservation status and sensitivity to change in habitat and ranges from a minimum of 0 (very common, widespread species which is highly tolerant of human disturbance) to 9 (range-restricted, threatened and sensitive endemic).				
Sources: [1]Samways (2008); [2]OdonataMap (2016)				

12.8. Appendix 8 Selected present and potentially occurring selected arachnid species

SPECIES & FAMILY[2,3]	COMMON NAME[2,3]	STATUS[1]	LO[2,3]
BUTHIDAE			
Parabuthus mossambicensis	Thick-tailed scorpions		2
Parabuthus transvaalicus	Thick-tailed scorpions		4
Uroplectes planimanus	Stinger scorpions		4
Uroplectes carinatus	Stinger scorpions		3
Uroplectes vittatus	Stinger scorpions		2
Uroplectes triangulifer	Stinger scorpions		2
SCORPIONIDAE			
Opistopthalmus pugnax	Burrowing scorpions	**PS***	2
Opistopthalmus glabifrons	Burrowing scorpions	**PS***	3
NEPHILIDAE			
Nephila senegalensis	Banded-legged Golden Orb-web Spider		1
ATYPIDAE			
Calommata simoni	African Purseweb Spider		1
THERAPHOSIDAE			
Harpactirella flavipilosa	Botswana Lesser Baboon Spider		3
Brachionopus pretoriae	Pretoria Lesser Baboon Spider		3
Harpactira hamiltoni	Golden Starbust Baboon Spider	**PS***	3
Pterinochilus junodi	Soutpansberg Starburst Baboon Spider	**PS***	4
Key			
Status: NT = Near-threatened; PS = Protected Species; VU = Vulnerable			
Likelihood of Occurrence (LoO): 2 = High; 3 = Moderate; 4 = Low			
Sources: [1]ToPS (2007); [2]Leeming (2003); [3]Dippenaar-Schoeman (2002)			
*Old ToPS (2007) list status,ToPS (2015) no longer lists these species as Protected.			

12.9. Appendix 9 Water Quality Related Impacts

It is important to assess WQ variables in order to determine the impacts within an ecosystem that may contribute toward changes within the biotic integrity.

Organic enrichment of aquatic ecosystems results in various chemical (dissolved oxygen, nutrient levels) and physical changes (turbidity and suspended solids) that in turn drive the biological changes within the receiving environment. For example, an organic discharge from the proposed piggery is not directly toxic to aquatic life but its effects may significantly change biotic community structure and biological processes. The main effects of organic enrichment are a decrease in dissolved oxygen concentrations, an increase in turbidity and the concentration of suspended solids, an increase in nutrient concentrations and possible bacterial contamination of the receiving water body (Dallas & Day, 2004). Previous studies indicated a number of water quality constituents higher than the recommended target levels including dissolved oxygen (DO), percentage oxygen saturation (DO%), electrical conductivity (EC), total dissolved solids (TDS), salinity, total alkalinity, total hardness, calcium (Ca^{2+}), chloride (Cl^-), magnesium (Mg^{2+}), sodium (Na^+), ammonium (NH_4^+), ammonia (NH_3), nitrate (NO_3^-), orthophosphate (PO_4^{2-}), sulphate (SO_4^-) biological oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), turbidity, *Escherichia coli* (*E. coli*), faecal coliform and Total coliform.

A piggery can lower the **DO** and **DO%** in water courses. These lowered oxygen levels are caused by a number of factors such as increased concentrations of constituents such as EC, TDS, salinity, ammonium, phosphates, nitrates, COD and increased algae content and aquatic plants due to increased fertilization. Oxygen levels continuously below 80% saturation can cause harmful physiological and behavioural stress effects on biota within an ecosystem. Juvenile fish are particularly susceptible to stress from oxygen depletion. Indirect influences of macro-invertebrate populations are common occurrences in oxygen depletion (Dallas & Day, 2004). The depletion of oxygen in conjunction with the presence of toxic substances can also lead to a compounded stress response in aquatic organisms. Increased toxicity of ammonium, sulphide, heavy metals (i.e. iron and manganese) has also been observed under such conditions (DWAF, 1996a). In addition, high concentrations of ammonium can enhance the growth of algae and aquatic plants. Bacteria can also convert this high ammonium to nitrate (NO_3^-) in the process of nitrification, which can therefore lower the oxygen in water courses (Dallas & Day, 2004).

According to DWAF (1996a), the potential for organic wastes to deplete oxygen is commonly measured as **BOD** and **COD**. The COD is also used as a routine measurement for effluents and measures the amount of oxygen likely to be used in the degradation of organic waste. It is unlikely that all organic matter will be fully oxidised and these measurements are unsuitable for aquatic ecosystems. However, these are useful for determining water quality requirements of effluents discharged into aquatic systems, in order to limit their impact (DWAF, 1996a).

A piggery can also cause elevated **EC, TDS** and **salinity** concentrations due to the increased of the ions and salts, namely calcium (Ca^{2+}), magnesium, sodium, nitrate and chloride (Cl^-). The increase in EC, TDS and salinity levels affects the buffering capacity of water and as a result the metabolism of aquatic organisms (DWAF, 1996). Each aquatic species has a specific tolerance to EC, TDS and salinity the juvenile stages are often more sensitive to these increases than adults (James *et al*. 2003). In addition, increased concentrations can sensitise these aquatic organisms to various pollutants such as heavy metals and biocides (Dallas & Day, 2004).

Increased **total alkalinity**, usually results from increased carbon dioxide (CO_2) in the water, which is directly related to the amount of plant life within the aquatic system that produces carbon dioxide. Effluent or run-off from a piggery acts as fertilizer for the algae and aquatic plants in the water courses. Total alkalinity is, therefore, a direct measure of farming activities and eutrophication (Dallas & Day, 2004, DWAF, 1996).

The **total hardness** concentrations consist mostly of calcium and magnesium ions and as such are directly proportionate to each other. As these components are usually present at high levels within aquatic ecosystems, they are not considered to be toxic. Changes from natural levels are characteristically associated with farming activities like piggeries. Little

literature is available on the effects of calcium and magnesium ions on fish, but there has been reference to excessively low levels resulting in impacts to fish communities (Dallas & Day, 2004). In contrast, an increase in calcium can lead to an increase in EC and TDS, which can cause chronic and acute physiological effects on aquatic biota. In addition, fluoride also reacts readily with magnesium at alkaline pH to form complexes which are not easily absorbed by aquatic biota. Mg can also interfere with nutrient availability (DWAF, 1996). On the other hand, hardness mitigates metals toxicity, because Ca^{2+} and Mg^{2+} help keep fish from absorbing metals such as lead, arsenic, and cadmium into their bloodstream through their gills. The greater the hardness, the harder it is for toxic metals to be absorbed through the gills (Cheremisioff & Davletshin, 2015).

As mentioned before, ions like calcium, chloride, magnesium and sodium contribute to the rise of salt levels in water courses. **Calcium** (Ca^{2+}) is a naturally occurring ion. However, elevated levels are caused by farming activities e.g. piggery. Other minor sources include the rocks with which the water are in contact with and atmospheric pressure. Calcium is an essential major element for living organisms. It is vital for muscle contraction, nervous activity, energy metabolism and biochemical interactions. Not much is known about the definite effects of concentration changes on aquatic biota. However, an increase in calcium can lead to an increase in EC, TDS and salinity which can cause chronic and acute physiological effects on aquatic biota. In addition, calcium is one of the ions that associated with total hardness of the water (Dallas & Day, 2004). **Chloride** (Cl^-) is one of the main anions in many inland waters and farming activities is a major source. Chlorides are widely distributed in nature as salts of sodium (NaCl), potassium (KCl), and calcium ($CaCl_2$). Chloride ions are involved in ionic, osmotic and water balances of body fluids. Chloride exhibit no toxic effects on living systems except where they have an effect by increasing the EC, TDS and salinity (Dallas & Day, 2004). **Magnesium** (Mg^{2+}) can be found in chlorophyll and usually observed in water sources with lots of aquatic plants and high algae content. Very little is known about the effect of magnesium on aquatic organisms. It is normally found in relatively high concentrations, therefore making it unlikely to act as a toxin or limiting nutrient (Dallas & Day, 2004). However, fluoride reacts readily with magnesium at alkaline pH value to form complexes which are not easily absorbed by aquatic biota and can also interfere with nutrient availability (DWAF, 1996). An increase in **sodium** (Na^+) is as a result of increased salt content caused by agricultural activities. Sodium is the least toxic metal cation and its effect on aquatic systems is almost entirely as a major contributor to EC, TDS and salinity (Dallas & Day, 2004)

Ammonia (NH_3) is generally formed from the decomposition of nitrogenous organic matter (Dallas & Day, 2004) in the surface or ground water, and it is one of the constituents of the nitrogen cycle (McKee & Wolf, 1963). In addition, atmospheric deposition of ammonia comes from the biological degradation of manure (in this case) and distillation and combustion of coal (DWAF, 1996). Ammonia occurs in either the free, un-ionized form (NH_3) or as ammonium ions (NH_4^+). The non-toxic ammonium (NH_4^+) is also converted to the highly toxic

ammonia at pH values greater than eight. The toxicity of ammonia is directly related to the concentration of the un-ionized form, which affects the respiratory system of many animals by either inhibiting cellular metabolism or by decreasing the oxygen permeability of the cell membrane (Gammeter & Frutiger, 1990). Acute toxicity in fish causes loss of equilibrium, hyperexcitability, increased breathing rate, cardiac output and oxygen intake, and in extreme cases convulsions, coma and death. In contrast, the ammonium ion has little or no toxicity (Williams *et al.* 1986), though it does contribute to eutrophication and the production of excessive algae, toxic nitrites and poor oxygen levels (Dallas & Day, 2004).

Nitrates (NO_3^-), enter the water courses via fertilizers and agricultural run-off e.g. piggeries. Nitrates are seldom abundant in natural surface water, because photosynthetic action is constantly converting them to organic nitrogen in plant cells. Very high concentrations can be toxic to fish because it interferes with oxygen uptake and can cause them to die of anoxia during activity when high oxygen demand is required (Dallas & Day, 2004). The main source of **orthophosphate** (PO_4^{2-}) is decomposition of organic matter (i.e. piggery) and run-off from agricultural lands where fertilizers have been used are additional sources. Elevated phosphate concentrations stimulate the growth of aquatic plants and considered to be the principle nutrient controlling the degree of eutrophication in aquatic ecosystems (DWAF, 1996). **Sulphates** are not toxic. However, in excess sulphates form sulphuric acid which reduces pH and affect the aquatic ecosystems negatively. Sulphates are reduced to hydrogen sulphide in anoxic (oxygen-free) conditions. Hydrogen sulphide ("bad egg gas") is an indicator of reducing conditions. It is toxic and inhibits a number of enzymes important in cellular metabolism. The effects of hydrogen sulphide have been proven toxic in the laboratory but could not be quantified in the field (Dallas & Day, 2004). In addition, the high sulphate content in the water has the capacity to leach heavy metals should they come into contact with any of the minerals or rock formations (WWF, 2011) and can cause increased metal concentrations (aluminium, iron, manganese and lead) in water courses.

According to Dallas & Day (2004), the concentration of **SS** may also increase when organic waste is discharged into a water body for example piggery effluent or run-off. The increase in SS leads to a decrease in light penetration and primary production and reduce food availability for organisms higher up the food chain. Benthic invertebrates will be affected because it changes the suitability of the substrate for some taxa, increase drift, affects respiration and feeding activities. Fish can be affected by having physiological effects (impairment of gill function or reduced resistance to disease), reduction in spawning habitat development hindering, change in migration patterns, reduction in food and intervention with hunting (Dallas & Day, 2004). Worst case scenario, the deposition of organic sludge in slower-flowing water may lead to releases of methane and hydrogen (as hydrogen sulphide) if the organic matter decomposes anoxically (without oxygen). This extreme will cause the elimination of normal benthic communities (Dallas & Day, 2004).

According to DWAF (1996b), ***total coliform*** bacteria are primarily used as a practical indicator of the general hygienic quality of water whilst ***faecal coliform*** bacteria are a

practical indicator of faecal pollution. *Faecal coliform are* also is more specific for faecal pollution than *total coliform* and used for assessment of faecal pollution of wastewater and raw water supplies. A highly specific indicator of faecal pollution is, ***E. coli*** which originates from humans and warm-blooded animals. These micro-organisms can cause diseases such as gastroenteritis, giardiasis, hepatitis, typhoid fever, cholera, salmonellosis, dysentery, eye, ear, nose and skin infections, which worldwide are associated with polluted water (DWAF, 1996b).

12.10. Appendix 10 Main CVs

CURRICULUM VITAE

Name: **KATHY TAGGART (neé van der Velde)**

Name of Firm: Natural Scientific Services CC
Position: Senior Environmental Scientist (Member)
Date of Birth: 5 February 1976
Nationality: South African
Languages: English (mother tongue), Afrikaans

EDUCATIONAL QUALIFICATIONS

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

KEY QUALIFICATIONS

- **Courses Completed:**

2009: Tools for Wetland Assessment Short Course, Rhodes University
2008. Wetland/Riparian Delineation Accreditation with DWAF
2008: Short Course: Soil classification and wetland delineation
2007. Back to Wetland Basics course. Presented by the Gauteng Wetland Forum & the Gauteng Department of Agriculture Conservation and Environment.
2004: Field Guide Training Course (Endorsed by Technikon SA, FGASA and WESSA).
2002: Introduction to ArcGIS1 (Course covered fundamental GIS concepts and set the foundations for ArcView, ArcEditor and ArcInfo).
2001: Foundation course in Environmental Auditing (IEMA approved).

Legal Environmental Processes:

Compiled numerous Scoping Reports, Environmental Impact Assessments, Environmental Management Programme Reports and Water Use Licence Applications as required by the relevant legislation.
Conducted Environmental Performance Audits for mining operations with existing approved EMPRs in the Northern Cape Province.
Conducted remediation audits for a number of industrial sites within South Africa.

Specialist Assessments:

Undertaken a number of wetland assessments (including delineations: WET-Health, WET-Ecoservices, Ecological Importance and Sensitivity (EIS) and wetland rehabilitation) within Gauteng, Mpumalanga, Kwa-Zulu Natal, Limpopo and North West Provinces.
Undertaken numerous ecological assessments within Gauteng, North West, Limpopo, Mpumalanga and KwaZulu Natal.
Project management for a number of biodiversity studies in Africa: Liberia, Zambia, Mozambique and Ethiopia.
Project management for numerous remediation projects in Gauteng, Mpumalanga, Kwa-Zulu Natal and the Eastern Cape.

EMPLOYMENT EXPERIENCE

Member: Natural Scientific Services. Johannesburg (October 2003-Present)

Project management and administration.

Project Manager and compilation of wetland delineations and assessments (including WET-Health, EcoServices, EIS and Rehabilitation) in Gauteng, North West, Limpopo, Northern Cape and Kwa-Zulu Natal.
Project management and compilation of ecological assessments and Biodiversity Management and Action Plans.
Compilation and management of a number of Environmental Impact Assessments, Environmental Management Programme Reports (EMPR's) and Water Use Licence Applications (WULA), for example:
Closure and rehabilitation Plan at Lonmin Platinum, Limpopo;
EIA for proposed aerial cable slide in Hazyview and proposed oxygen pipeline in Middelburg Mpumalanga;
Upgrade of existing EMPR's for 4 of the Lonmin Platinum operations in line with the new Minerals and Petroleum Resources Development Act;
EIA and WULA for the proposed Middelkraal No 2 vertical shaft, Lonmin Platinum Mine;
WULA for the proposed conversion of the Buffelspoort Dam Water Use Rights from agricultural to industrial, Lonmin Platinum Mine and Aquarius Platinum Mine.
IWWMP for the Lonmin Marikana Mining operations.
Remediation Project Management for various projects, for example:
Various DOW and DOW Agro Science (DAS) sites in South Africa;
Defunct Mines in the Loskop Dam Catchment – Department of Water Affairs;
Remediation Audits for a number of DOW sites.
Performance Audits for existing mining operations, specifically within the Northern Cape Conducted environmental education courses for Delta Environmental Centre.
Tender and proposal
compilation. Marketing.

Liaison with clients and government officials.

- **Environmental Scientist: Jones & Wagener (November 2000 – September 2003)**
  Project management and administration.
  Vegetation surveys for proposed mining developments within Mpumalanga and the Free State.
  Project management and compilation of EIA's, EMPR's and WULA's
  Remediation work for the DWA
  Surface water quality monitoring and compilation of water monitoring reports.
  Development of a Best Practice Guideline for the sampling and testing of the various surface and groundwater samples being collected at the Sasol Secunda complex and associated coal mining operations.

MEMBERSHIPS IN PROFESSIONAL SOCIETY

- South African Council for Natural Scientific Professions (PrSciNat – Ecological and Environmental Science)
- Accredited with DWA as a Competent Wetland Ecologist in the field of wetland/riparian delineations
- International Association for Impact Assessment (IAIA)

PAPERS PRESENTED

- VAN DER VELDE, ROGERS, WITKOWSKI
  - Population structure and dynamics of *Ficus sycomorus* L., along the Sabie River, Kruger National Park. Paper presented at the **6th International Conference on Fig Biology**, Cape Town, September 2000.
- VAN DER VELDE, WITKOWSKI, ROGERS
  - Change in the population structure of *Ficus sycomorus* L., along the Sabie River, Kruger National Park, after a major disturbance event. Paper presented at the **27th Annual South African Association of Botanists (SAAB) Conference**, Johannesburg, January 2001.

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 and administration
- Project Management of and input into Ecological Assessments
- Tender and proposal compilation
- Marketing
- 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 for SAFARI 2000- Kruger National Park
  - Scientific 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 2003

CURRICULUM VITAE

Name:	**TYRON KEN CLARK**
Name of Firm:	Natural Scientific Services CC
Position:	Terrestrial Ecologist
Date of Birth:	30 January 1987
Nationality:	South African
Languages:	English (first language), Afrikaans

EDUCATIONAL QUALIFICATIONS

- BSc Honours Zoology (2014). Zoology (University of the Witwatersrand,
- Johannesburg). BSc Botany and Zoology (2010). (University of South Africa, Pretoria).

KEY EXPERIENCE

- **Specialist Assessments:**

  Five years specialist consulting experience on over 70 projects in six countries (South Africa, Botswana, Lesotho, Mozambique, Sao-tome & Principe and Sierra Leone) and all provinces in RSA conducting and / or managing the following:

  - Faunal assessments.
  - Wetland assessments.
  - Landscape Function Analysis.
  - Floral assessments (assisting).
  - Aquatic biomonitoring (assisting) and water sampling.
  - Public participation meetings.
  - Green Star ratings, Green Building Council.
  - Biodiversity management and action plans.
  - Impact assessments.

- **Research**
  - The potential application of ground-penetrating radar for faunal research in South Africa (current)

- Climatic niche modelling; investigating the susceptibility of South Africa to invasion by exotic reptiles using Maxent (2014).
- Geographic Information Systems, ArcGIS and Diva GIS (2014).
- Statistical analysis, R statistical computing program (2013).
- Time-activity budgets of Rock Hyrax (2010).
- Vegetation sampling, analysis and classification (2009-2010).
- Preparation of samples for DNA sequencing and analysis (2009).
- Amphibian acoustic recordings and analysis (2009).

Environmental Tutoring:

Four years at Happy Acres environmental centre actively educating youth on biological topics in a practical setting.

Courses Completed:

- 2015: Wetland Management: Introduction and Delineation (University of the Free State)
- 2013: First aid Level 1 and 2 (Wilcare Safety Solutions)
- 2013: Off Road Driving (Proactive Driving for Sasol Botswana)
- 2010: Snake identification course (African Reptiles and Venom)
- 2010: Venomous snake handling course (African Reptiles and Venom)
- 2010: Snakebite treatment and IV course (African Reptiles and Venom)

EMPLOYMENT EXPERIENCE

Natural Scientific Services, Johannesburg (November 2010-Present)

Position Title: Terrestrial Ecologist

Key Focus Area: Ecological surveys, expanded below:

- Project Management
- Fieldwork, validating data and interpreting field findings
- Report writing for EIA's, EMPR's and water use Licences
- Administrative activities including: Presentations, meetings, desktop research, general project management and support to other staff members in implementing specific projects.
- Research activities

Happy Acres Environmental Education Centre 2007

Teaching school groups about the environment with emphasis on biology in a practical setting.

Holly Brooke Horse Farms 2006

Guiding horse trails around the Magaliesberg area, part time (ongoing).

London Equestrian Centre 2005

Employee at the LEC in London, England:

- General care of horses including all stabling, livery and day to day duties.
- Education attained several British Horse Society qualifications.

RVS enterprises invoicing and sales, for DOMESTI hardware fixtures 2004-2005

- Invoicing
- Orders
- Sales
- Admin

MEMBERSHIPS

- Herpetological Association of Africa
- Magaliesberg Biosphere Project

Final Basic Assessment Report – Proposed Expansion of a Pig Production Enterprise for Legae La Thlago (Pty) Ltd
Plot 684 Agricultural Holdings, Winterveldt, Pretoria

APPENDIX H:
ENVIRONMENTAL MANAGEMENT PROGRAMME

contents

1 INTRODUCTION

1.1 Purpose of the Environmental Management Programme

This Draft Environmental Management Programme (EMPr) is prepared as part of the requirements of the Environmental Impact Assessment (EIA) Regulations (December 2014, as amended) promulgated under the National Environmental Management Act (NEMA) (Act 107 of 1998, as amended). The purpose of this Environmental Management Programme (EMPr) is to ensure "good environmental practice" by taking a holistic approach to the management and mitigation of environmental impacts during the construction and operation phase of Legae La Tlhago's proposed piggery expansion. This EMPr therefore sets out the methods by which proper environmental controls are to be implemented by the piggery's management. The Draft EMPr is to be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) as part of the Application for Environmental Authorisation for Legae La Tlhago's proposed piggery expansion on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria.

This EMPr is considered as a document that can be updated as new information becomes available during the construction, operational and operational phases, if applicable, of the proposed development. Mitigations measure need to be implemented as addressed in this EMPr, except where they are not applicable, and additional measures should be considered when necessary. The EMPr identifies the following:

- Construction and Operation activities that will impact on the environment;
- Specifications with which the piggery's management shall comply in order to protect the environment from the identified impacts; and
- Actions that shall be taken in the event of non-compliance.

This EMpr incorporates management plans for the design, construction, operation and decommissioning phases of the project, which consist of the following components:

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

1.2 Contents of the EMPr

This EMPr specifies the management actions necessary to ensure minimal environmental impacts, as well as procedures for monitoring these impacts associated with the proposed activity. In terms of legal compliance, this EMPr aims to satisfy appendix 4 of Government Notice Regulation 982 of 4 December 2014, presented in Table 1-1 below.

Table 1-1: Compliance with Appendix 4 of Government Notice Regulation 982 of 4 December 2014 and Section 24N of the National Environmental Management Act 107 of 1998.

Requirements according to Appendix 4 of GNR 982 of 4 December 2014	Section
(1) An EMPr must comply with section 24N of the Act and include- a) details of - (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.3 Appendix I
b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	Section 2, Figure 2-1, 2-2, 2-3
d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Section 4
(i) planning and design;	Section 4
(ii) pre-construction activities;	Section 4
(iii) construction activities;	Section 4
(iv) rehabilitation of the environment after construction and where applicable post closure; and	Section 4
(v) where relevant, operation activities;	Section 4
e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	Section 4
f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to – i. avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 4
ii. comply with any prescribed environmental management standards or practices;	Section 4
iii. comply with any applicable provisions of the Act regarding closure, where applicable; and	N/A
iv. comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	N/A
g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 4
h) frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 4
i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 4
j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 4
k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 4

Requirements according to Appendix 4 of GNR 982 of 4 December 2014	Section
l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 4
m) 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; and	Section 4
n) any specific information that may be required by the competent authority.	N/A

1.3 Environmental Assessment Practitioner

Organisation	Council for Scientific and Industrial Research (CSIR)
Postal Address	PO Box 320, Stellenbosch, 7599
Email	mlevendal@csir.co.za / bmqokeli@csir.co.za
Telephone No.	021 888 2495/32
Fax	021 888 2693
Project Team	
Name	Qualification & Expertise
Minnelise Levendal	• MSc Biological Science (Botany) (Stellenbosch University) • More than 16 years of experience in Environmental Management • Inclusive of 10 years' experience in conducting Environmental Assessments
Babalwa Mqokeli	• MSc Ecological Science (University of KwaZulu-Natal) • 2 years' experience in the environmental management field (Terrestrial & Aquatic Ecology) • Less than 1 years' experience conducting Basic Assessments

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

2 PROJECT BACKGROUND

2.1 Project Activities

Legae La Tlhago (Pty) Ltd is a small-scale pig and vegetable farming enterprise located on an 8 hectare farm on Plot 684 Winterveldt Agricultural Holdings in Winterveldt, Pretoria. The business consists of 4 members and they propose to expand the Pig Farming division of the enterprise by developing a 1.05 ha pig facility, with a throughput of 1049 pigs, as well as two waste dams measuring $50m^3$ and $31.25m^3$. The current operations of the business comprise of a 10 sow piggery and cultivation of vegetables. The proposed expansion is for a 100 sow unit, with targets to supply major supermarkets and butcheries within the Mabopane, Soshanguve, Ga-Rankuwa and the Tshwane Market. Legae La Tlhago's proposed piggery expansion will add great socio-economic value to the pork industry in the area, to the consumer, the business, and to allow local employment opportunities, as well as contributing greatly to the farming industry of South Africa.

The proposed infrastructure of the piggery upon completion will entail the following:

1 x Boar house
1 x Farrowing house
1 x Weaner house
1 x Grower house
1 x $50m^3$ Waste dam
1 x $31.25m^3$ Waste dam

Housing units will consist of a combination of slated and concrete floors. The pig waste will fall through the slatted floor, and will be temporarily stored under the slatted floor in a waste holding pit until it is flushed to flow through an enclosed gutter conveying it to a concrete slurry dam. The waste dam will always have water covering the solid waste allowed to settle at the bottom of the slurry dam to trap the smell. As the solids fill the lagoon the clear water on top will overflow into the overflow dam where it will be disinfected and pumped back to the piggery for cleaning purposes. After the minimum digestion period lapses the waste will be pumped out onto the fields as a fertilizer. Both concrete dams will be made water tight.

Pig production will include the following operational process:

- Young sows will be purchased during the course of the year to allow for breeding to occur consecutively throughout the year. 30 week old sows will then be placed with the boars for breeding.
- Breeding sows will then be moved to the Farrowing house, and fed on a balanced feed.
- After delivery, piglets are weaned at 28 days to be housed at the Weaner house, and the sow goes back to the boar house to start the cycle.
- 10 weeks old weaners are then transferred to the Grower house, where they are kept until they reach a marketable size. Once the pig reaches a live weight of approximately 100 kilograms, then it is ready to be sold, that is it has reached its marketable size. These will then be sold to abattoirs and/or butcheries in the local area.

2.2 Listed Activities

As part of the proposed piggery expansion, listed activities defined under the National Environmental Management Act, Act No. 107 of 1998 (NEMA, 1998), as amended, in terms of the Environmental Impact Assessment (EIA) Regulations, Government Notice (GNR) 983 of 4 December 2014, and in terms of the

National Environmental Management Waste Act (NEM:WA) Regulations GNR 921 of 29 November 2013 there under will take place. Relevant listed activities triggered by the proposed activities are described as follows:

GNR.983 Activity 27: *The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-*
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

GNR. 983 Activity 39: *The expansion and related operation of facilities for the concentration of animals for the purpose of commercial production in densities that will exceed-*
(ii) 8 square meters per small stock unit, where the expansion will constitute more than;
(b) 250 additional pigs, excluding piglets that are not yet weaned;

GNR. 921 Category A (1): *The storage of general waste in lagoons.*

GNR. 921 Category A (12): *The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).*

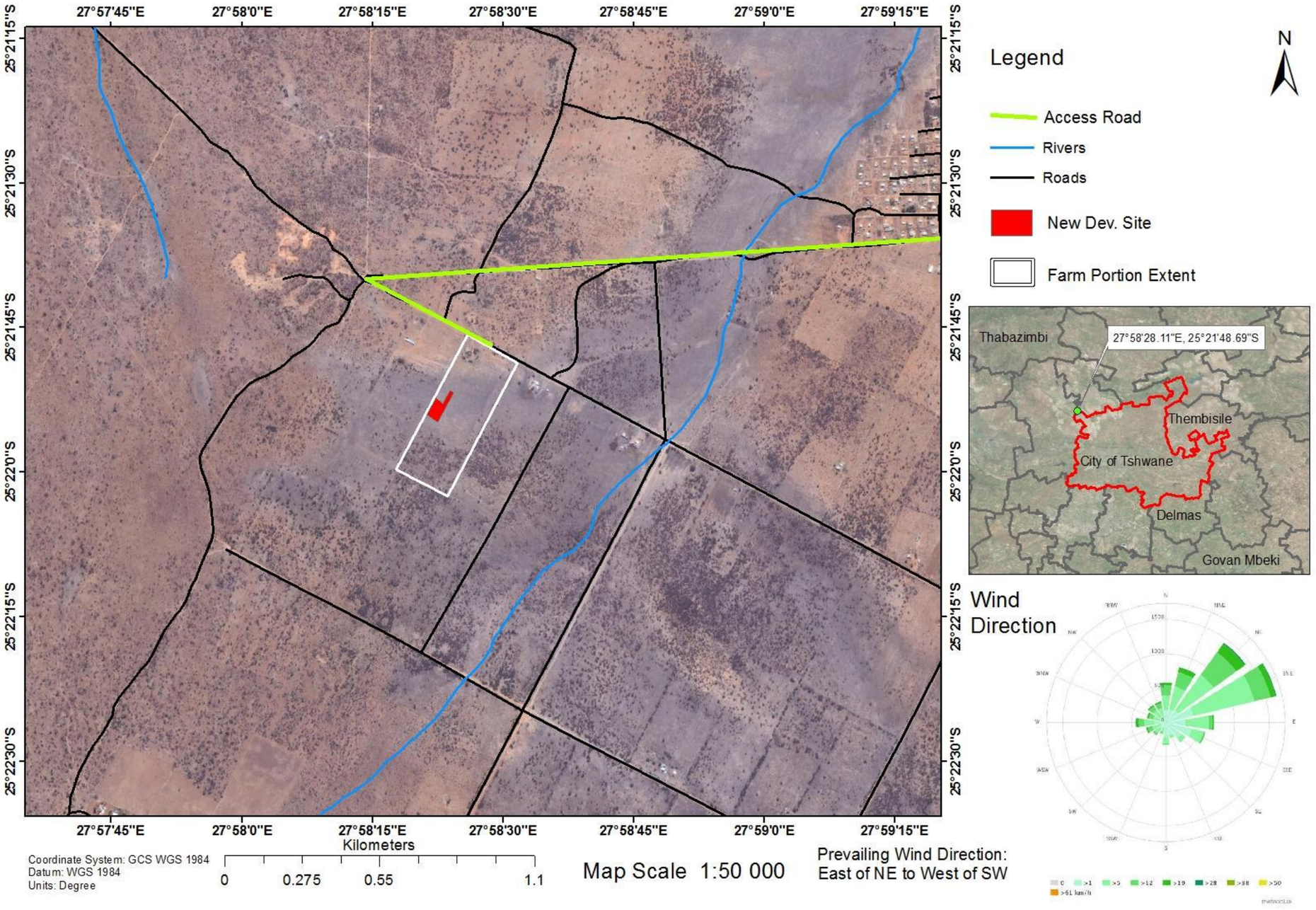

Figure 2-1:Legae La Tlhago Site Location on Plot 684 Winterveldt Agricultural Holdings, Winterveldt, Pretoria.

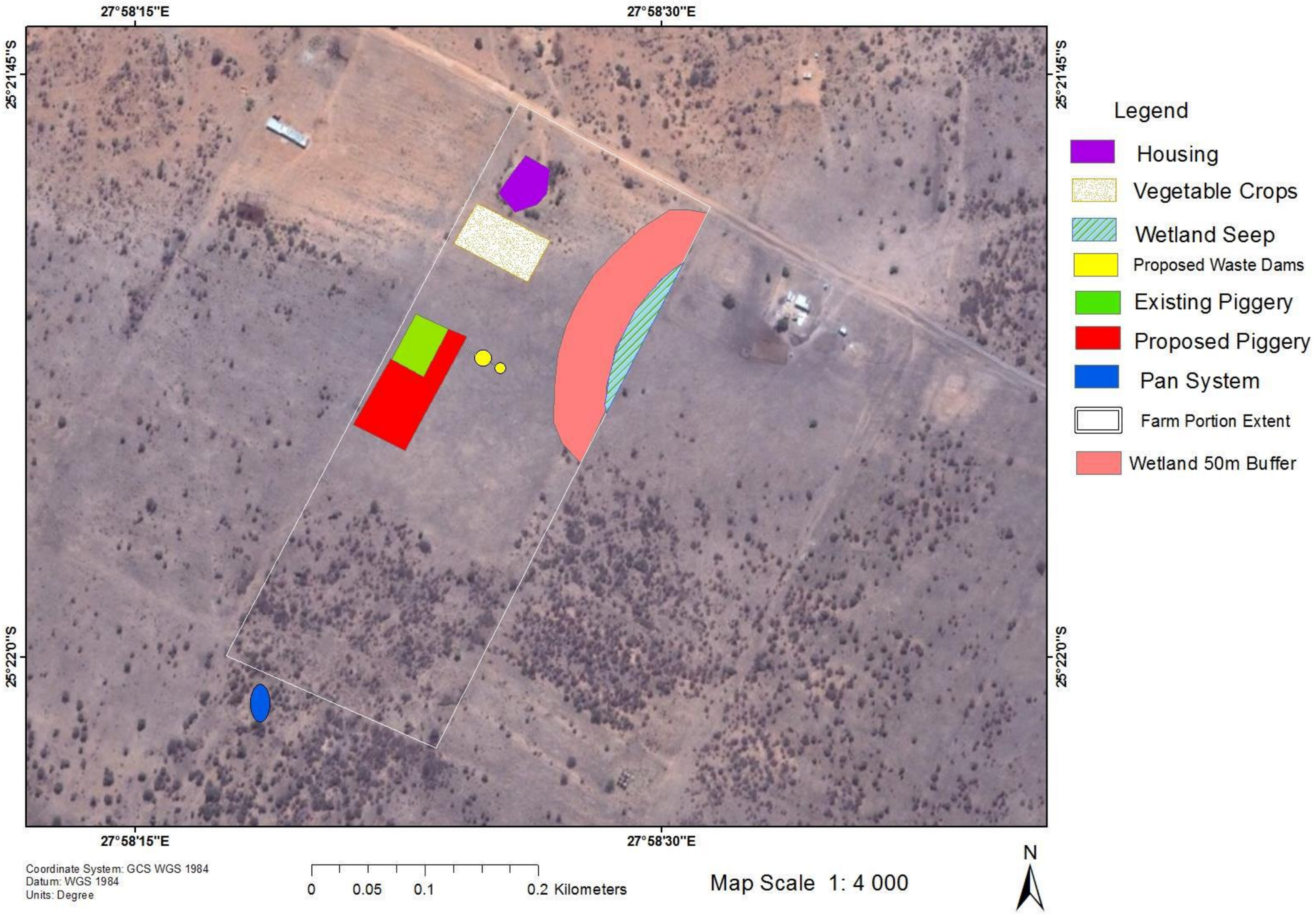

Figure 2-2: Legae La Tlhago Site Layout of current infrastructure and proposed Piggery expansion, including sensitivities on site .

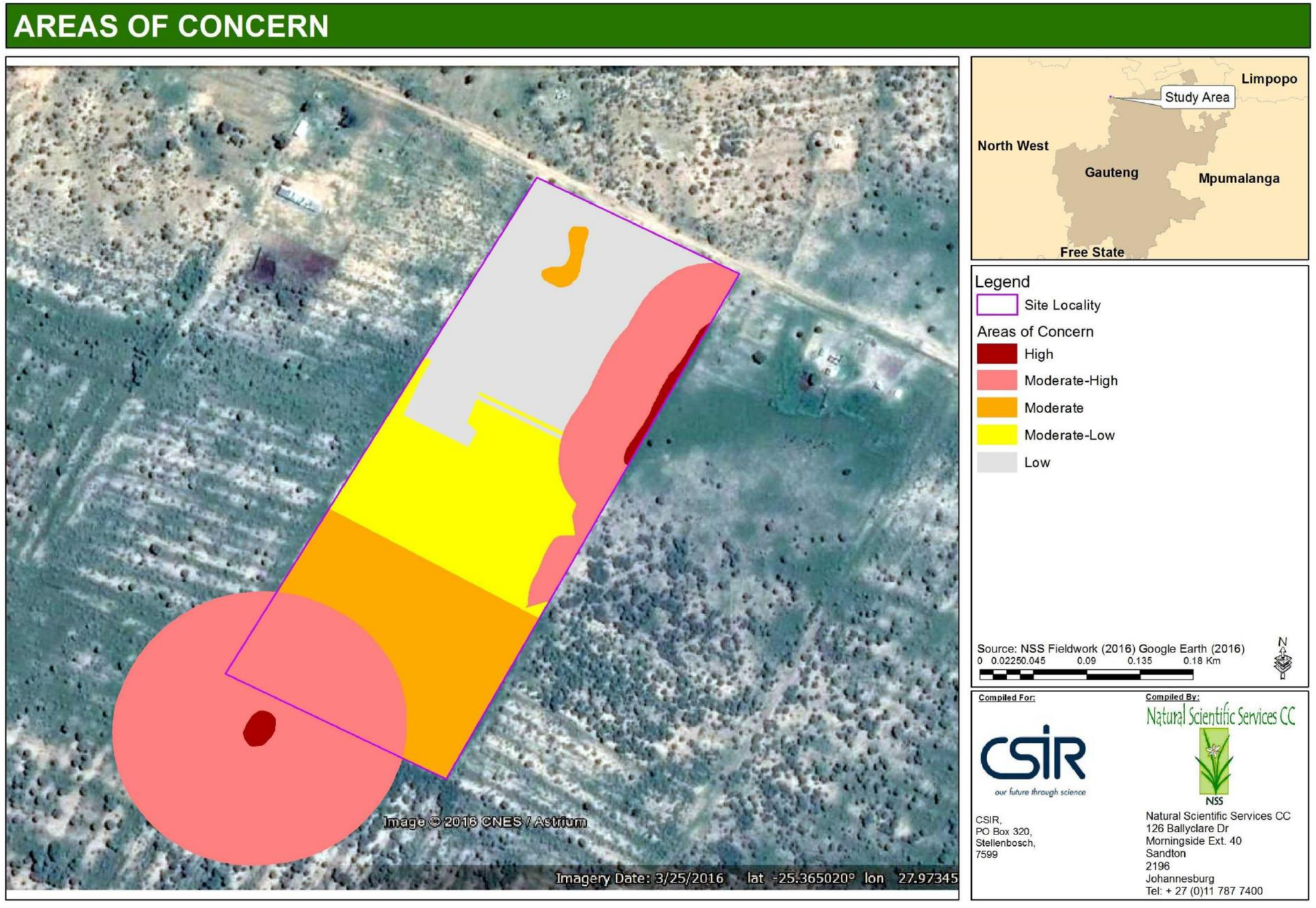

Figure 2-3: Legae La Tlhago Farm depicting Areas of Concern as determined by the Ecological Specialist Study (NSS, 2017) .

3 DESCRIPTION OF APPLICABLE LEGISLATION, POLICIES AND GUIDELINES.

Legislation, policy of guideline	Description of compliance
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998 as amended).	An application for Environmental Authorisation for the proposed development is submitted in terms of GNR 982 of NEMA EIA Regulations, 4 December 2014, promulgated under NEMA.
GNR 982 of NEMA EIA Regulations, 4 December 2014	To promote integrated environmental management, contents of this EMPr adhere to the requirements of Appendix 4 of the EIA Regulations. This EMPr outlines the conditions that the project will adhere to if authorisation is received. Appendix E of the BAR refers to the Public participation followed thus far in undertaking this assessment.
National Environmental Management Waste Act (NEM:WA) GNR 921, 29 November 2013	An application for a Waste Management Licence will be submitted in terms of NEM:WA as the proposed activity pertains to the following activities of the Act: Category A (1): The storage of general waste in lagoons. Category A (12): The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).
National Water Act, 1998 (Act 36 of 1998)	Water Use Licence Application (WULA)
National Development Plan	The South African Government through the Presidency has published a National Development Plan. The Plan aims to eliminate poverty and reduce inequality by 2030. The Plan has the target of developing people's capabilities to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety. It proposes the following strategies to address the above goals: 1. Creating jobs and improving livelihoods; 2. Expanding infrastructure; 3. Transition to a low-carbon economy; 4. Transforming urban and rural spaces; 5. Improving education and training; 6. Providing quality health care; 7. Fighting corruption and enhancing accountability; 8. Transforming society and uniting the nation.
National Heritage Resources Act 25 of 1999	An application for Heritage Resources review was submitted to SAHRA (Case ID: 97840) in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) as amended.
National Environmental Management Biodiversity Act 10 of 2004	The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) as amended (NEMBA) including all the pertinent legislation published in terms of this act was considered in compiling this EMPr. This included the determination and assessment of the fauna and flora prevailing in the proposed project and the handling thereof in terms of NEMBA.
Tshwane Metropolitan Municipality IDP and SDF	The Spatial Development Framework (SDF) is the legislated

Legislation, policy of guideline	Description of compliance
	component of the municipality's Integrated Development Plan (IDP) that prescribes development strategies and policy guidelines to restructure and reengineer the urban and rural form. The SDF is the municipality's long-term vision of what it wishes to achieve spatially, and within the IDP programmes and projects. The SDF should not be interpreted as a blueprint or master plan aimed at controlling physical development, but rather the framework giving structure to an area while allowing it to grow and adapt to changing circumstances. The proposed project has considered and is guided by the Regions SDF and IDP priorities of the area.

4 ENVIRONMENTAL MANAGEMENT STRUCTURE

Legae La Tlhago's management will develop an Environmental Management Structure, in line with this EMPr, that is appropriate to the size and scale of the project to develop and implement roles and responsibilities with regards to environmental management.

4.1 Roles and Responsibilities

Key roles and responsibilities in order to meet the overall goal for environmental management of the proposed piggery expansion are as follows:

Legae La Tlhago Management (hereafter referred to as "Management")

Management is responsible for the overall environmental monitoring and implementation of the EMPr, and ensuring compliance thereof with the specifications of the Environmental Authorisation (EA) issued in terms of NEMA. Management should also ensure that any other permits or licences required as part of this project are obtained and complied with. Legae La Tlhago may however, at their own costs, render the services of an external environmental consultant to oversee the implementation of the documented mitigation measures of this EMPr. It is also expected that management will appoint an Environmental Control Officer, Environmental Health and Safety Officer, and Construction Manager.

Environmental Control Officer

The Environmental Control Officer (ECO) will be the responsible person for ensuring that the provisions of the EMPr as well as the EA are complied with at all times. The ECO must fully communicate the environmental management processes associated with the project, particularly the EMPr, as well as review and ensure compliance with the conditions of the EMPr. The ECO will be responsible for issuing instructions to contractors and employees in terms of actions required with regards to environmental considerations. The ECO shall, on a regular basis, prepare and submit written reports to Management and the Competent Environmental Authority (GDARD) as required.

Environmental Health & Safety (EHS) Officer

It is important to note that the EHS Manager will be appointed to fulfil the roles of the Environmental Officer during the construction phase and that of the Environmental Manager during the operational phase. A generic term has therefore been assigned to this sector of roles and responsibilities. The responsibility of the

EHS Manager includes overseeing the implementation of the EMPr during the construction and operational phases, monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessary. The EHS Manager is also responsible for monitoring compliance with the conditions of the Environmental Authorisation that may be issued to Legae La Tlhago.

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

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

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

During operation, the EHS Manager will be responsible for:

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

During decommissioning, the EHS Manager will be responsible for:

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

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

Construction Manager

The construction manager will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the facility.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employs 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 Draft EMPr, a construction manager has not been appointed and appointment will depend on the project receiving authorisation and proceeding to the construction phase.

5 ENVIRONMENTAL MANAGEMENT PLAN

As part of environmental management and enhancement, an identification and description of impact management objectives must be developed, inclusive of the proposed methods and effective management and mitigation measures required during the design, construction and operational phases of the proposed piggery. The table below lists potential impacts and mitigation measures recommended for the proposed Legae La Tlhago piggery and agricultural development at the different phases.

Table 5-1: Impact management plan for the proposed Legae La Tlhago piggery expansion

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Design and Planning Phase					
5.1 Loss of vegetation and faunal habitat as a result of poor planning and design.	To prevent further loss of vegetation on site, specifically in high sensitive areas.	• Development planning must ensure loss of vegetation and disturbance is restricted to within the recommended expansion site layout. • Clearly demarcate or fence in the construction site. Relocate specimens that are situated in the construction footprint, according to the advice of an appropriate specialist. • Development must be planned for areas that are already transformed. • Identify and mark indigenous trees on the ground. Those that are small and cannot be avoided should be transplanted elsewhere on site.	• Legae La Tlhago Management to ensure development layout adheres to the proposed mitigation measures of this EMPr	During design	Management
5.2 Loss of Conservation Important (CI) or medicinally important flora, in accordance with law and best practice, and encourage	To protect plants of conservation concern.	• Development planning to be restricted to already disturbed or transformed areas as far as possible, as per the recommended site layout.	• Legae La Tlhago Management to verify implementation of	During design	Management Botanist/Horticulturist

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Design and Planning Phase					
rehabilitation.		• If removing CI species such as the Protected Marulas or stapeliads then submit and obtain permits for their removal. • Prior to construction any CI and medicinally important floral specimens that may occur within the site layout footprint (areas zoned for the piggery, effluent dam, orchard or cropland) should be collected and replanted in the surrounding areas.	the mitigation measures proposed in this EMPr.		
5.3 Loss of wetlands.	The avoidance of wetland loss is a priority.	• Development planning to re-align area set aside for piggery expansion to avoid the wetland and associated wetland buffer, as per the specialists' recommendation. • Re-align the proposed piggery expansion in a north-easterly/south-westerly direction as opposed to the easterly direction proposed. • No construction should be planned within the sensitive environment (wetlands).	• Legae La Tlhago Management to ensure development layout verifies the proposed mitigation measures of this EMPr.	During design	Management
5.4 The introduction and spread of alien invasive species.	To prevent the spreading and increase of alien invasive species.	• Ensure that alien invasive species are identified on site. • Regulate / limit access by potential vectors of alien plants. • Alien invasive species identified on site should be removed prior to construction. • Manual or mechanical removal should be done as opposed to chemical removal. • Carefully regulate / limit access by vehicles and materials to the construction site. Demarcate or fence in the construction area. • By law, remove and dispose of Category 1b	• Legae La Tlhago Management to verify implementation of the mitigation measures proposed in this EMPr.	All phases	Management ECO Construction manager

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Design and Planning Phase					
		alien species on site. All Category 2 species that remain on site must require a permit. • Prohibit the introduction of domestic animals such as dogs and cats.			
5.5 Destruction of natural habitats and consequential loss and/or displacement of fauna.	To prevent the loss and minimise the disturbance of natural habitats, and ultimately prevent the loss of ecosystem function on site.	• Areas of sensitive fauna to be avoided in the layout plan for the proposed development. • If any of the remaining natural areas are to be affected, adhere to law and best practice guidelines regarding the handling and relocation of CI fauna. • It is recommended that a suitably qualified specialist be assigned to find and relocate any CI fauna on site to nearby suitable habitat (i.e. Termitaria that may be destroyed within the project footprint should be carefully searched for. Striped Harlequin Snakes and night time searches for hedgehogs and bullfrogs should be performed).	• Legae La Tlhago Management to ensure development layout verifies the proposed mitigation measures of this EMPr. • A monitoring programme should be implemented to assess the presence of faunal species within sensitive vegetation.	During design and planning	Management Ecologist
5.6 Impact on water quality (surface and ground water) and downstream aquatic ecology from ineffective containment of the piggery wastewater and the irresponsible application of pig waste to land, as well as other waste and hazardous material.	To prevent deterioration of water quality and downstream aquatic ecology, and ensure effective design of waste and wastewater management	• It is essential to ensure that the pig houses and associated drains and slurry facility are designed and lined with impermeable substances (e.g. concrete) in accordance with advice from suitably qualified agricultural experts and international best practice norms. The primary aim should be to avoid contamination of the drainage feature. • Remove the current drain and slurry facility from within the wetland buffer to the adjacent terrestrial zone.	• Legae La Tlhago to apply for a Water Use Licence (WULA) with reference to the proposed use of waste water. • Legae La Tlhago Management to ensure development layout and plan verifies the	During design and planning	Management ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Design and Planning Phase					
	system.	• Ensure that the gutter conveying pig effluent is closed i.e. piped to the slurry pond to prevent spillage and contact with wildlife. • Incorporate effective storm water management design aspects into the infrastructure plan so as to prevent impacts of flooding. • Determine wastewater use practices, in terms of fertilisation, in accordance with the recommendations of the National Water Act, Section 21 (e). The use of waste water for agricultural purposes is applicable to the Department of Water Affairs' recognition of waste water as a valuable resource for use as a fertilizer. • 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. .	proposed mitigation measures of this EMPr.		
5.7 Impact of the development if a detailed stormwater management plan is not compiled and effectively implemented.	To prevent the impact of uncontrolled stormwater run-	• Planning should include a detailed stormwater management plan outlining appropriate measures to address runoff from the developed area during the construction	• Legae La Tlhago to ensure that this is taken into consideration during	During design and planning	Management Designing engineer

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Design and Planning Phase					
	off as a result of developed areas	and operation of the piggery. •	the planning and design of the piggery.		

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Construction Phase					
5.8 Potential of soil erosion due to exposed soil.	To prevent soil erosion and consequential sedimentation of watercourses in close proximity.	• Limit vehicles, people and materials to the construction site. • Construction to preferably be undertaken in winter, when there is minimal risk of erosion • Revegetate denude area with indigenous flora as soon as possible. • Implement erosion protection measures on site to reduce erosion and sedimentation of downstream Kutswane River. Measures could include bunding around soil stockpiles, and vegetation of areas not to be developed. • Take action before erosion develops to a large scale. • Limit vegetation removal to only the construction area, avoid disturbance to other areas.	• Ensure that regular site inspections are carried out throughout the construction phase. • ECO to verify that mitigation measure proposed in this EMPr are implemented and submit a report thereof on a monthly basis.	Daily during the construction phase.	Management / Contractor / EHS Officer ECO
5.9 Sensory disturbance of fauna.	To minimise the effect of sensory disturbances on fauna.	• Limit construction activities to day time hours. • Minimize or eliminate security and construction lighting, to reduce the disturbance of nocturnal fauna. • All outside lighting should be directed away from sensitive areas. • Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least. • Minimize noise to limit its impact on sensitive fauna such as potentially occurring owls, korhaans and secretary birds.	• Ensure that regular site inspections are carried out throughout the construction phase. • ECO to verify that mitigation measure proposed in this EMPr are implemented and submit a report thereof on a monthly basis.	Daily during the construction phase.	Construction Crew, Legae La Tlhago Management

5.10 Degradation of ambient air quality as a result of dust other emissions generated.	To minimise the impact on the ambient air quality as a result of construction activities and increased traffic to and from the site.	• Exposed areas should be re-vegetated with locally indigenous flora. If the soil is compacted, it should be ripped, and fertilised. • Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road. • A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.	• Air emissions to be monitored throughout the construction phase. • Ensure regular maintenance of construction vehicles to allow for 'cleaner' emissions from these vehicles, including equipment maintenance.	Daily during the construction phase.	Construction Crew Management
5.11 Noise disturbances as a result of construction activities.	To minimise noise generation on site.	• Activities that will generate the most noise should be limited to during the day in order minimise disturbance to the neighbours. • Construction activities should be restricted to clearly demarcated areas. • No sound amplification equipment to be used on site, except in emergency situations • Limit vehicles travelling to and from the site to minimise traffic noise to the surrounding environment. • A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.	• ECO to ensure compliance and reporting thereof.	During the construction phase.	Construction Crew Management ECO
5.12 Loss of vegetation and faunal habitat as a result of poor planning and design	To prevent further loss of vegetation on site, specifically in high sensitive areas.	• Development planning must ensure loss of vegetation and disturbance is restricted to within the recommended expansion site layout. • Clearly demarcate or fence in the construction site. Relocate specimens that are situated in the construction footprint,	• Legae La Tlhago Management to ensure development layout verifies the proposed mitigation measures of this EMPr	During design.	Management

		according to the advice of an appropriate specialist. • Development must be planned for areas that are already transformed. • Identify and mark indigenous trees on the ground. Those that are small and cannot be avoided should be transplanted elsewhere on site.			
5.13 Loss of Conservation Important (CI) or medicinally important flora, in accordance with law and best practice, and encourage rehabilitation.	To protect plants of conservation concern.	• Development planning to be restricted to already disturbed or transformed areas as far as possible, as per the recommended site layout. • If removing CI species such as the Protected Marulas or stapeliads then submit and obtain permits for their removal. • Prior to construction any CI and medicinally important floral specimens that may occur within the site layout footprint (areas zoned for the piggery, effluent dam, orchard or cropland) should be collected and replanted in the surrounding areas.	• Legae La Tlhago Management to verify implementation of the mitigation measures proposed in this EMPr.	During design.	Management Botanist/Horticulturist
5.14 Loss of wetlands.	The avoidance of wetland loss is a priority.	• Development planning to re-align (relocate) area set aside for piggery expansion to avoid the wetland and associated wetland buffer, as per the specialists' recommendation. • Re-align the proposed piggery expansion in a north-easterly/south-westerly direction as opposed to the easterly direction proposed. • No construction should be planned within the sensitive environment (wetlands).	• Legae La Tlhago Management to ensure development layout verifies the proposed mitigation measures of this EMPr.	During design.	Management ECO
5.15 The introduction and spread of alien invasive species.	To prevent the spreading and increase of alien	• Ensure that alien invasive species are identified on site. • Regulate / limit access by potential vectors of	• Legae La Tlhago Management to verify	All phases.	Management Construction crew

	invasive species.	alien plants. • Alien invasive species identified on site should be removed prior to construction. • Manual or mechanical removal should be done as opposed to chemical removal. • Carefully regulate / limit access by vehicles and materials to the construction site. Demarcate or fence in the construction area. • By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit. • Prohibit the introduction of domestic animals such as dogs and cats.	implementation of the mitigation measures proposed in this EMPr.		ECO
5.16 Destruction of natural habitats and consequential loss and/or displacement of fauna.	To prevent the loss and minimise the disturbance of natural habitats, and ultimately prevent the loss of ecosystem function on site.	• Areas of sensitive fauna to be avoided in the layout plan for the proposed development. • If any of the remaining natural areas are to be affected, adhere to law and best practice guidelines regarding the handling and relocation of CI fauna. Search and rescue measures to be implemented. • It is recommended that a suitably qualified specialist be assigned to find and relocate any CI fauna on site to nearby suitable habitat (i.e. Termitaria that may be destroyed within the project footprint should be carefully searched for. Striped Harlequin Snakes and night time searches for hedgehogs and bullfrogs should be performed).	• Legae La Tlhago Management to ensure development layout verifies the proposed mitigation measures of this EMPr. • A monitoring programme should be implemented to assess the presence of faunal species within sensitive vegetation.	During design and planning.	Management Ecologist
5.17 Soil and surface water pollution as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	To prevent deterioration of water quality and	• Establish appropriate emergency procedures for accidental contamination of the surroundings. • Mixing of cement or concrete must not take	• Legae La Tlhago to apply for a Water Use Licence (WULA) with reference to	During design and planning	Management

	downstream aquatic ecology.	place on the soil surface, to be undertaken on designated areas..	the proposed use of waste water. • Legae La Tlhago Management to ensure development layout and plan verifies the proposed mitigation measures of this EMPr.		
5.18 Soil and water pollution as a result of poor waste management.	To prevent soil and water resources pollution.	• Construction waste must be disposed of at a licensed landfill site. • Waste containers must be available on site at all times. • A waste management plan must be adopted and implemented. This plan should consider the type of waste, storage, disposal method and facility as well as methods to reduce waste on site. • Ensure compliance with waste management legislation.	• Management and ECO to ensure compilation and implementation of waste management plan, including mitigation measures proposed in this EMPr	During design and planning, and construction.	Management ECO
5.19 Construction activities may disturb or destroy sites or features of heritage importance.	To protect heritage resources.	• The site does not have any heritage resources, however should any archaeological features be discovered on site then a qualified Heritage specialist and SAHRA will be notified.	• Report any features of heritage significance.	During construction phase	Management ECO
5.20 Diversion and impendance of surface water flows and increased potential for erosion.		• Stormwater Management Measures should be implemented. • Stormwater and any run-off generated by the hard surfaces should be discharged into retention swales or berms. • Perform periodic inspections and maintenance of soil erosion measures and	• Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	Weekly	Management ECO

		stormwater control structures			
5.21 Contamination of stormwater as result of chemicals, cement, waste etc.	To prevent stormwater contamination which could subsequently impact natural areas and freshwater ecosystems.	• Stormwater must be diverted around areas of cement mixing, chemical/fuel handling and storage and waste containment areas. • Provide secure storage for fuel, oil, chemicals and other waste materials to prevent contamination of stormwater runoff. Fuels and chemicals (i.e. any hazardous materials and dangerous goods) used during the construction phase must be clearly marked and stored safely on site and in bunded areas. • Littering and contamination of water resources during construction must be prevented by effective construction camp management.	• Check compliance with specified conditions of the Stormwater Management Plan and Method Statement.	Weekly	ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
5.22 Impact on water quality (surface and ground water) and downstream aquatic ecology from ineffective containment of the piggery wastewater and the irresponsible application of pig waste to land, as well as other waste and hazardous material.	To prevent the pollution of the aquatic system.	• Pig housing must have slatted floors which collect waste and conduct it through enclosed concrete canals. • Pig waste must be stored in an enclosed concrete waste storage. • The application of the liquid waste onto the agricultural field must adhere to the Water Act legislation and Water Use Licence permit. • The use of solid waste as compost on the agricultural field must adhere to Waste Act and Waste Management Licence terms.	• ECO to ensure compliance to proposed mitigation measures and conduct regular inspection and provide reports thereof.	Weekly during operation.	ECO Management EHS Officer

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
		• Hazardous waste must be stored in suitable containers and disposed of accordingly.			
5.23 Impact of waste generated on site during the operational phase of the piggery.	To prevent pollution and to maintain the aesthetic of the site and surrounding area.	• Waste must be stored in designated areas for storage. • Clearly demarcate appropriate storage for the different types of waste. • Ensure regular removal of waste on site to prevent attraction of pests and disposal of waste in a permitted disposal site. • Minimise the production of waste. • Waste should be recycled or re-used where possible.	• ECO to develop a waste management plan and ensure implementation and adherence thereof. • Regular site inspection to ensure that the proposed mitigation measures are being implemented. • Produce monthly reports to show compliance.	Daily during operation.	ECO Management
5.24 Impact on ambient air quality from piggery emissions and odour.	To minimise air emissions that may cause a nuisance to the surrounding area.	• Cover the waste dams to reduce the odour. • Piggery must be kept clean as far as possible to minimise odour emissions, regularly flush housing units. • Implement best practices in terms of waste regulation of the dam and practice good housekeeping of the pig housing units. Avoiding unnecessary build-up of waste in the housing units and dams.	• A complaints register must be kept on the farm to record any odour complaints that may arise. • Ensure that regular site inspections are conducted as well as	Daily site inspections during the operational life of the piggery.	Management EHS Officer

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
		• Ensure sufficient ventilation of the housing units. • Subject the pig solid waste to the aerobic process to reduce its odour.	daily inspection and recovery of pig mortalities.		
5.25 Impact of dust and vehicle emissions generated during use of the gravel road when transporting pigs and vegetables during operation.	To minimise the impact of transport activities on the air quality and surrounds.	• Vehicles transporting to and from the farm must keep at minimum speed to reduce dust generation. • Vehicles that are used must be roadworthy and regularly inspected in order to prevent unwanted emissions. • Traffic dust will be minimal considering that the piggery will make use of one vehicle thus no significant increase in traffic.	• Monitor traffic control measures and report non-compliance. • A complaints register must be kept on the farm, in which any dust complaints from the public must be logged.	During the operation phase.	EHS Officer Management
5.26 Noise disturbances as a result of operational activities and squealing from pigs	To minimise noise generation on site.	• Activities that will generate the most noise should be limited to during the day in order minimise disturbance to the neighbours. • No sound amplification equipment to be used on site, except in emergency situations • Limit vehicles travelling to and from the site to minimise traffic noise to the surrounding environment. • A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.	• ECO to ensure implementation of the mitigation measures, compliance and reporting thereof. • A complaints register must be kept on the farm, in which any noise complaints from the public must be	Daily during the operation phase.	Construction Crew, Management ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
		• Excessive noise from the pigs can be caused when the pigs are disturbed, and as such unnecessary disturbance of the pigs should be avoided.	logged.		
5.27 Impact on terrestrial and aquatic systems due to accidental spills of hazardous substances such as diesel container kept on site to fuel the generator.	To prevent ground and water pollution from hazardous chemicals.	• Appropriate storage of hazardous material such as diesel must be implemented. • The ground where refuelling takes place must be protected and refuelling to be handled in a cautious manner. • Spills of diesel and other hazardous material must be cleaned immediately using bioremediation products. • Ensure that any accidental spills do not move beyond the designated storage area. • Ensure appropriate and safe disposal of hazardous chemicals. • Ensure training of staff to handle hazardous chemicals.	• EHS to create safety awareness. • ECO to verify that mitigation measure proposed in this EMPr are implemented and submit a report thereof on a monthly basis.	Once prior to operation. Daily during the operation phase.	EHS Officer Management
5.28 Impact on Biosecurity and transmission of diseases.	To prevent the attraction of pests and animals carrying infectious diseases. To ensure the containment of	• Regularly clean the piggery to minimise influx of pests. • Pig mortalities must be identified and removed immediately from the piggery. • Training of workers to effectively handle sick and dead animals. • Restrict piggery access and use disinfectant sprays on vehicles and personnel entering the site.	• Regular site inspections must be conducted and monitoring of adherence to EMPr measures must be conducted.	Daily during the operation phase.	Management ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
	disease outbreaks.	• Feeding areas must be regularly cleaned to prevent the attraction of flies. • Piggery must have security fencing around it to prevent access of other animals such as dogs. • Emergency procedures that aim to address the potential for disease outbreaks must be developed and implemented where applicable.			
5.29 Impact on sensitive areas such as the wetland and sensitive flora.	To minimise the impact on sensitive sites.	• Limit human activity on areas that are close to sensitive sites. • Piggery activities must be undertaken away from these areas and associated buffers.	• Regular monitoring and site inspections to be conducted and ensure adherence to this EMPr.	Daily during the operation phase.	Management ECO
5.30 Impact on natural vegetation during operational activities.	To minimise the disturbance and destruction of natural vegetation on site.	• Activities should be restricted to already transformed areas. • Existing site entrance should be used to reduce impact on natural vegetation.	• Site monitoring should be conducted daily and report any non-compliance.	Daily during the operation phase.	Management ECO
5.31 The introduction and spread of alien invasive species as a result of increased activity on site and vehicles being vectors.	To prevent the spreading and increase of alien invasive species.	• Ensure that alien invasive species are identified on site. • Regulate / limit access by potential vectors of alien plants. • Manual or mechanical removal of alien invasives should be done as opposed to chemical removal.	• Legae La Tlhago Management to verify implementation of the mitigation measures proposed in this EMPr.	Daily	Management

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
		• Carefully regulate / limit access by vehicles and materials to the site. • By law, remove and dispose of Category 1b alien species on site. All Category 2 species that remain on site must require a permit. • Prohibit the introduction of domestic animals such as dogs and cats.			
5.32 Impact of operational activities on fauna.	To minimise the disturbances on fauna.	• Minimize or eliminate lighting, to reduce the disturbance of nocturnal fauna. • All outside lighting should be directed away from sensitive areas. • Commence (and preferably complete) construction during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least. • Minimize noise to limit its impact on sensitive fauna such as potentially occurring owls, korhaans and secretary birds. • Create awareness on the importance of fauna and ecosystem functioning.	• ECO to development a management plan to prevent faunal disturbance and displacement. • An assessment should be undertaken to determine and monitor sensitive animals on site.	Regular inspection every six months.	Management ECO
5.33 Potential for workers' safety being compromised due to handling hazardous material and biomedical substances.		• Worker to wear Personal Protective Equipment (PPE). • Hazardous material must be correctly labelled and handled in a safe manner.			EHS Management
5.34 Potential impact on heritage resources.	To protect heritage resources.	• The site does not have any heritage resources, however should any archaeological features be discovered on site then a qualified Heritage specialist and SAHRA will be notified.	• Report any features of heritage significance.	N/A	Management ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
5.35 Loss of Conservation Important (CI) or medicinally important flora due to harvesting.	To protect plants of conservation concern.	• Harvesting of indigenous flora for medicine, fire wood, building materials, and other purposes must be prohibited. • Education of the Farm Management and team required prior to operation and with yearly refresher talks.	• Legae La Tlhago Management to verify implementation of the mitigation measures proposed in this EMPr.	When necessary during operation.	Management
5.36 Impact on electricity and groundwater due to increased use during operation.	To prevent overuse of resources.	• Create awareness on the importance of these resources and implement energy and water saving mechanisms. • This activity will make use of renewable energy for its activities. • Prevent wasting of water such as leaving running taps. • Regular inspection of use should be conducted, including regular inspection of the borehole, water tanks, for any leaks.	• Leaking water storage structures must be reported immediately.	Daily during operation.	Management
5.37 Potential for fires to occur.	To prevent fires occurring on site.	• 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. • Maintain an effective fire break between the development area and the surrounding natural environment (especially the ridge to the north, where the fire-dependent Highveld Blue butterfly may occur) • Educate workers about the plan and emergency procedures with regular training and notices.	• Ensure effective fire management plans and equipment to deal with fire incidence is readily available at all times on site.	Daily during operation.	Management ECO EHS Officer

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
5.38 Potential impact of traffic.		• Limit the amount of vehicles using this route. • Traffic impact will be minimal considering that the piggery will make use of one vehicle thus no significant increase in traffic.	• Ensure adherence to speed limit and other traffic regulations.	Daily during operation.	Management ECO
5.39 Stormwater discharge into the surrounding environment during operations.	To minimise the contamination of stormwater which could subsequently impact the surrounding ecosystems. To protect soil resources and prevent soil erosion.	• Stormwater measures should be inspected regularly to ensure proper functioning of stormwater structures. • An operational phase Stormwater Management Plan should be designed and implemented, with a view to prevent the passage of concentrated flows from hardened surfaces and onto natural areas.	• Ensure the compilation of a Stormwater Management Plan for the operational phase. • Inspect and verify if a Stormwater Management Plan has been compiled prior to the commencement of the operational phase. • Undertake regular monitoring and inspections, and record non-compliance.	Once-off prior to the commencement of the operational phase. Weekly or Monthly.	Management
5.40 Soil and water resources pollution as a result of poor waste water management and pig mortality management.	To manage wastewater and to prevent the pollution of soil and water resources.	• All wastewater application on land must be in accordance with the Department of Water and Sanitation's guidelines in terms of wastewater use. • Ensure adherence to wetland buffer zones and soil quality monitoring requirements as	• Undertake regular monitoring and inspections to verify implementation of the proposed mitigation	During the operational phase.	Management ECO

Impact Description	Environmental Objective	Management/Mitigation Measures	Monitoring Compliance & Reporting	Monitoring Frequency	Responsibility
Operational Phase					
		stipulated in these guidelines. • The depth to aquifer must be more than 5m for dewatered sludge application and must be more than 10m for liquid sludge application. The distance from surface water or borehole must be more than 400m. • Mortalities must be stored in an enclosed area prior to being taken to the mortality pit. • The mortality pit must be regularly monitored and maintained, avoiding exceeding the capacity of the pit.	measures, and record non-compliance.		

Note from the CSIR: Decommissioning and/or closure phase is not expected to occur for the proposed piggery. Should there be plans to close down the piggery; a closure plan will be submitted to the competent authority for approval.

6 ENVIRONMENTAL AWARENESS AND TRAINING PLAN

Legae La Tlhago Management has to appoint an independent Environmental Control Officer whose duty is to also implement an effective environmental awareness plan aimed to educate workers and contractors in terms of the biodiversity on site, environmental risks associated with the proposed development and land management of the site. Training and/or awareness should be raised and effectively communicated prior to the commencement of the construction phase. Training sessions should incorporate the management plans addressed in this EMPr as well as any new information and documentation provided by the ECO, as well as that of the Environmental Health & Safety Officer. The ECO would be the most suitable person to conduct these training sessions, identifying sensitive environments as well as all the risks and impacts, such as effluence, associated with the piggery and the methods in which to deal with the impacts in order to avoid environmental degradation. Training sessions can be monitored by providing an attendance register indicating the workers that received training as well as evidence of the training and/or awareness received. These sessions would also need to be carried out throughout the operational phase of the piggery, at least once a year, or as new information becomes available.

7 EXTRACT FROM SOUTH AFRICAN PORK PRODUCERS' ORGANISATION (SAPPO) BEST PRACTICE STANDARDS

Housing for small piggeries

- ***Some dimensions: (see sketches on p19)***
- ***An all- purpose pen can be—***

- **4m by 3m i.e. 12 square metres,**
- **Roof will be 3m x 3m or 3m x 4m in area, sloping from back to front; height 2.5m at back, 1.65 in front;**
- **Where sows and piglets share the same pen, a creep area across the rear of 1m x 3m keeps sow from creep feed and piglet sleeping area;**
- **Floor slopes 1% to gate and drain – outside and to a pond or soak-away.**

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This all-purpose pen will accommodate any of the following:-

- **1 or 2 sows with litters (this pen will have a creep area);**
- **2 or 3 litters of weaned pigs up to 10 weeks old;**
- **4 dry sows or gilts;**
- **1 boar with a couple of sows;**
- **15 grower pigs up to 70kg live mass; or**
- **12 baconers up to 90 - 95 kg live mass**

Note: a general rule for space per pig is to allow at least 1sq m per 100 kg of live pig in closed pens; boars and sows need double or more .

8

Housing for small piggeries

There are cheaper alternatives that are quite acceptable; using locally available materials and ingenuity can go a long way, provided that the basic specs are met.

The following pictures show some examples of inexpensive housing that has been built with an understanding of the needs of pigs of all ages; there are also some that do not meet requirements.

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BASIC ASSESSMENT REPORT

APPENDIX I: CURRICULUM VITAE of the PROJECT TEAM

contents

Annexure I.1: Minnelise Levendal (Project Leader)

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South Africa

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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

CONTACT DETAILS:

Postal Address: P O Box 320, Stellenbosch, 7599
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Cell: 0833098159
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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:

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

MEMBERSHIPS:

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

EMPLOYMENT RECORD:

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

PROJECT EXPERIENCE RECORD:

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

Completion Date	Project description	Role	Client
2011 *(in progress)*	EIA for the proposed Electrawinds Swartberg wind energy project near Moorreesburg in the Western Cape	Project Manager	Electrawinds
2010-2011 *(in progress)*	EIA for the proposed Ubuntu wind energy project, Eastern Cape	Project Manager	WKN Windkraft SA
2010-2011 *(in progress)*	EIA for the proposed Banna ba pifhu wind energy project, Eastern Cape	Project Manager	WKN Windkraft SA
2010-2011	BA for a powerline near Swellendam in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010-2011 *(Environmental Authorisation granted in September 2011)*	EIA for a proposed wind farm near Swellendam in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010 (complete)	Basic Assessment for the erection of two wind monitoring masts near Swellendam and Bredasdorp in the Western Cape	Project Manager	BioTherm Energy (Pty Ltd
2010 (complete)	Basic Assessment for the erection of two wind monitoring masts near Jeffrey's Bay in the Eastern Cape	Project Manager	Windcurrent (Pty Ltd
2009-2010 (*(Environmental*	Basic Assessment Process for the proposed erection of 10 wind monitoring masts in SA	Project Manager	Department of Energy through SANERI; GEF

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

PUBLICATIONS:

Bowie, M. (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 ^{13}C under varying temperature regimes in leaf-succulent and drought-deciduous shrubs from the Succulent Karoo, South Africa. South African Journal of Botany 67:235-243.

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

LANGUAGES

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

Minnelise Levendal

29 August 2016

Annexure I.2: Babalwa Mqokeli (Project Manager)

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CURRICULUM VITAE OF BABALWA MQOKELI – PROJECT MANAGER

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First names:	Babalwa Ruth
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Gender:	Female
Languages:	IsiXhosa, English and IsiZulu
Nationality:	South African
Driver's licence:	Code C1
Membership:	SACNASP Membership

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EDUCATIONAL QUALIFICATIONS:

TERTIARY	
Institute:	University of KwaZulu-Natal
Duration:	2011-2012
Qualification:	MSc Ecological Science
Institute:	University of KwaZulu-Natal
Duration:	2010
Qualification:	BSc Honours Ecological Science
Institute:	University of Zululand
Duration:	2006-2009
Qualification:	BSc Biological Science

COURSES	
Institute:	Council for Scientific and Industrial Research (CSIR)
Duration:	01-02 August 2016
Qualification:	Presentation Skills
Institute:	Council for Scientific and Industrial Research (CSIR)
Duration:	10-11 November 2015
Qualification:	Project Management I
Institute:	Business Success Solutions
Duration:	29-30 October 2015
Qualification:	Environmental Law (Short Course)
SECONDARY	
School:	Durban Girls' Secondary School
Year:	2004
Qualification:	Matric
Subjects passed:	Mathematics, Biology, Business Economics, History, English and Afrikaans
SKILLS	
Computer skills:	Microsoft Office, Email Internet and Databases search
GIS skills:	ArcGIS 10

EMPLOYMENT INCLUDING VOLUNTEER WORK:

Company:	Council for Scientific and Industrial Research (CSIR)
Duration:	August 2015- Currently
Job title:	Environmental Assessment Practitioner Intern
Responsibilities:	Project manager for Basic Assessment projects, Conduct Public Participation, GIS Mapping, Conduct site visits, Project assistant for EMF development and Report Compilation
Company:	University of KwaZulu-Natal
Duration:	February 2015-May 2015
Job title:	Teaching Assistant
Responsibilities:	Leading a 1st year laboratory in conducting and guiding biology practicals, liaising with other demonstrators in running the laboratory, interacting and assisting learners with biology practicals, assessing learners and compiling a marks list to provide to the Schools' administrator
Company:	Nature's Valley Trust (WWF-SA Environmental Leaders Programme)
Duration:	April 2013- September 2014
Job title:	Conservation Research Intern
Responsibilities:	Coordinating the Groot River monitoring research project, coordinating the Invasive alien Mosquito fish research project and the Groot Estuary fish research project, assisting with administrative tasks and field work for the Fynbos research project as well as that of the conservation forums, assisting in NVT's public

	events and social media management, Involved in environmental education activities with local schools and community outreach programmes
Company:	University of KwaZulu-Natal
Duration:	2010-2012 (when needed)
Job title:	Voluntary Research Assistant
Responsibilities:	• Conducting field work • Compiling data
Company:	University of KwaZulu-Natal
Duration:	2010-2012
Job title:	Undergraduate Biology Tutor
Responsibilities:	• Assisting students with the module • Assisting learners with biology practicals • Marking of learners work
Company:	University of Zululand
Duration:	2009
Job title:	Tutor
Responsibilities:	• Assisting students with the module and practicals • Assisting the lecturer in class • Marking of learners work
Company:	Durban Botanical Gardens
Duration:	2009 (June Vacation)
Job title:	Herbarium Volunteer
Responsibilities:	• Plant pressing and classification

CONFERENCE PAPERS

International Association for Impact Assessors South Africa (IAIAsa) 2016 Annual Conference - Overlap between biodiversity conservation & economic development: a case study of a proposed piggery near Cedarville, Eastern Cape, A project under the DEA Special Needs and Skills Development Programme.

Microscopy Society of Southern African Annual Conference (MSSA) 2011 - Palatal and lingual adaptations for frugivory and nectarivory in the Wahlberg's epauletted fruit bat (Epomophorus wahlbergi).

WORKSHOPS:

2015 Practical Adaptation for vulnerable communities by Adaptation Network, Kirstenbosch Botanical Gardens, Cape Town, August 2016.

2013 African Marine Debris Summit, Kirstenbosch Botanical Gardens, Cape Town, June 2013.

PROFESSIONAL REGISTRATION

South African Council for Natural Scientific Professions: Candidate Natural Scientist (100215/15)

RESEARCH PUBLICATIONS

1. DOWNS, C.T., MQOKELI, B.R.& SINGH, P. 2012. Sugar assimilation and digestive efficiency in Wahlberg's epauletted fruit bat (Epomophorus wahlbergi). Comparative Biochemistry and Physiology A 161: 344-348.

2. MQOKELI, B.R. & DOWNS, C.T. 2012. Blood plasma glucose regulation in Wahlberg's epauletted fruit bat. African Zoology 47:348-352.

3. MQOKELI, B.R. & DOWNS, C.T. 2013. Palatal and lingual adaptations for frugivory and nectarivory in the Wahlberg's epauletted fruit bat (Epomophorus wahlbergi). Zoomorphology 132: 111-119.

4. MQOKELI, B.R. & DOWNS, C.T. 2014. Is protein content in the diet of Wahlberg's epauletted fruit bats, Epomophorus wahlbergi, important? African Zoology 49: 161-166.

REFEREES

Name:	Minnelise Levendal
Title:	Senior Environmental Assessment Practitioner
Organisation:	Council for Scientific and Industrial Research
Contact:	021 888 2495
Name:	Dr Mark Brown
Title:	Program Director
Organisation:	Nature's Valley Trust
Contact:	044 531 6820
Name:	Prof Colleen Downs
Title:	Associate Professor/ Lecturer/ SARCHI Research Chair
Organisation:	University of KwaZulu-Natal
Contact:	033 260 5127

LANGUAGES

Language	***Speaking***	***Reading***	***Writing***
English	*Excellent*	*Excellent*	*Excellent*
IsiXhosa	*Excellent*	*Excellent*	*Excellent*
IsiZulu	*Excellent*	*Excellent*	*Excellent*
Afrikaans	*Fair*	*Good*	*Good*

Babalwa Mqokeli

29 August 2016

Annexure I.2a: Declaration of the EAP

DECLARATION OF THE EAP

I ZABALWA R. MOOKELI, declare that -

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation, policies and guidelines;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I 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 at large and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties, state department and competent authority will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and

Signature of the Environmental Assessment Practitioner:

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

Name of company:

24/08/16

Date:

Signature of the Commissioner of Oaths:

2016/08/24

Date:

Act Branch Manager

Designation:

Commissioner of Oaths Official stamp (below)

BRANCH MANAGER
2016 -08- 24
TSHWANE
TAKBESTUURDER

In the event where the EAP or specialist is not independent (Regulation 13(2) and (3) of the EIA Regulations, 2014), the proponent or applicant must, prior to conducting public participation, appoint another EAP or specialist which meets all the general requirements including being independent, to externally review all work undertaken by the EAP or specialist, at the applicant's cost appointed to manage the application.