Humphries Boerdery (Pty) Ltd

Humphries Boerdery Wean-to-Finish Site – Draft Basic Assessment Report

Locality: Bela-Bela

LEDET REF: 12/1/9/1-W125

NEAS REF: LIM/EIA/0000259/2016

Date: 8 November 2016

SHANGONI
Management Services (Pty) Ltd

DRAFT BASIC ASSESSMENT REPORT

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Locality: Bela-Bela

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8 November 2016

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SHANGONI
Management Services (Pty) Ltd

PROJECT DETAILS	
Department	**Limpopo Department of Economic Development, Environment and Tourism**
LEDET Reference No.:	**12/1/9/1-W125**
NEAS Reference No.:	**LIM/EIA/0000259/2016**
Project Title:	**Humphries Boerdery Wean-to-Finish Site**
Project Number:	**HUM-BEL-15-09-29**
Compiled by:	**Karien Venter**
Date:	**8 November 2016**
Location:	**Bela-Bela**
Technical Reviewer:	**Jan Nel**
Technical Review Sign-off	

Undertaking by the EAP

I, Karien Venter working as an EAP at Shangoni Management Services declare that:

- All work undertaken relating to the proposed project were done as an independent consultant;
- I have the necessary expertise to conduct EIA's including the required knowledge and understanding of any guidelines or policies that are relevant to the proposed activity;
- I have undertaken all the work and associated studies in an objective manner, even if the findings of these studies were not favourable to the project proponent;
- I have no vested interest, financial or otherwise, in the proposed project or the outcome thereof, apart from remuneration for the work undertaken;
- I have no vested interest, including any conflicts of interest, in either the proposed project or the studies conducted in respect of the proposed project, other than complying with the relevant required regulations;
- I have disclosed all material information in my possession that may have the potential to influence the competent authority's decision and/or objectivity in terms of any reports, plans or documents related to the proposed project as required by the regulations.
- I have included all comments and inputs provided by the Interested and Affected Parties during the Public Participation Process in the Basic Assessment Report.

EXECUTIVE SUMMARY

The Applicant

Humphries Boerdery (Pty) Ltd is an established pig farm near Bela-Bela in the Limpopo Province. The farm is located on Portion 50 of the Farm Tweefontein 463 KR.

Background description

Humphries Boerdery has been operational for more than 22 years. The pig farm currently houses 17 500 pigs in 29 houses. The farm is also equipped with a biodigester that enables Humphries Boerdery to treat the wastewater generated at the piggery.

Project description

Humphries Boerdery wishes to establish a wean-to-finish site. The development will entail the following:

- The development of a wean-to-finish unit where weaner piglets are grown until they are ready for slaughter. These pigs are called baconers.
- The construction of seven (7) wean-to-finish platforms. Each platform will have one (1) house and each house will have one (1) room (therefore a total of 7 rooms). Each room houses 810 wean-to-finish pigs. The total capacity within the wean-to-finish rooms is therefore 5 670 baconers. The dimensions of one platform: 12m x 67.5m (810m2) x 7 platforms = 5 670m2.
- The total footprint size of all the wean-to-finish platforms is therefore 5 670m2 (0.567ha).
- The total development footprint, including the platforms and open spaces between and surrounding the platforms is: 205m x 100m = 20 500m2 (2.05ha).
- The construction of an office block that will include a store room and ablution facilities. The office block will have the following dimensions: 5m x 10m (50m2).

The following describes the basic process that will be followed to raise the baconer pigs:

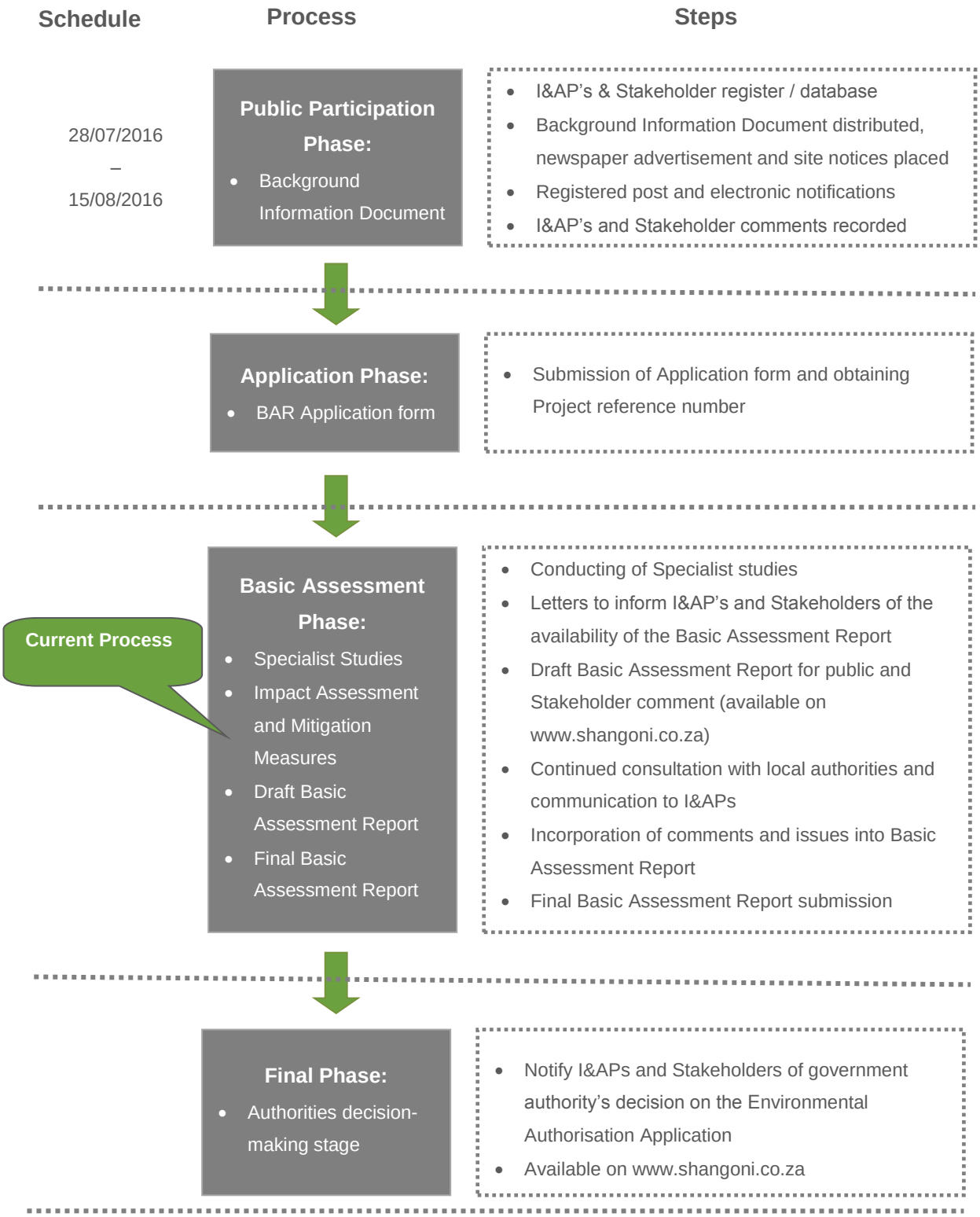
- Weaner piglets will be delivered to the wean-to-finish unit at three weeks of age. Each fourth week, 810 weaner piglets will be delivered.
- Once the pigs are 21-24 weeks old, they will be collected and taken to an abattoir for slaughter.

Legal requirements and legislative process

As part of the proposed Humphries Boerdery Wean-to-Finish Site project, listed activities defined under the National Environmental Management Act, Act 107 of 1998 (NEMA) will be conducted. To obtain the required environmental authorisations for these activities, the procedure, as prescribed in the Environmental Impact Assessment regulations of 2014 (GNR 982 of 4 December 2014) (hereafter 2014 EIA Regulations), will be followed. Relevant listed activities triggered by the proposed activities are described further in this Basic Assessment Report (refer to Part 3.4).

It is the intention of this Basic Assessment Report to provide the necessary information pertaining to the proposed activities associated with the project, as required in terms of the 2014 EIA Regulations under the NEMA. This Basic Assessment Report intends to highlight all information relevant to the proposed Humphries Boerdery Wean-to-Finish Site project.

The diagram below provides a visual representation of the Basic Assessment approach followed in terms of NEMA and the 2014 EIA Regulations.


Schedule
Process
Steps
28/07/2016
–
15/08/2016
Public Participation Phase:
Background Information Document
I&AP's & Stakeholder register / database
Background Information Document distributed, newspaper advertisement and site notices placed
Registered post and electronic notifications
I&AP's and Stakeholder comments recorded
Application Phase:
BAR Application form
Submission of Application form and obtaining Project reference number
Current Process
Basic Assessment Phase:
Specialist Studies
Impact Assessment and Mitigation Measures
Draft Basic Assessment Report
Final Basic Assessment Report
Conducting of Specialist studies
Letters to inform I&AP's and Stakeholders of the availability of the Basic Assessment Report
Draft Basic Assessment Report for public and Stakeholder comment (available on www.shangoni.co.za)
Continued consultation with local authorities and communication to I&APs
Incorporation of comments and issues into Basic Assessment Report
Final Basic Assessment Report submission
Final Phase:
Authorities decision-making stage
Notify I&APs and Stakeholders of government authority's decision on the Environmental Authorisation Application
Available on www.shangoni.co.za

Anticipated impacts

For the purpose of the Basic Assessment report it is required by Appendix 1 paragraph (1)(d) of the 2014 EIA Regulations that the major potential impacts that the activities, processes and actions may have on the surrounding environment be identified.

Identification of the major potential impacts has therefore been included in this Basic Assessment Report. The prediction of the nature of each impact, the evaluation of each impact by rating its significance and the management and mitigation measures adopted to address each impact, will be assessed in the Basic Assessment report Part 8.

The activities associated with the proposed project are described in full in Part 3 and the anticipated impacts of the proposed project are described in Part 8.

Potential significant impacts that have been identified during the Basic Assessment phase are listed in the table below:

Table 1: Summary of Impacts identified

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
Planning and Design						
Harm to the environment due to inadequate planning and design of the piggery unit	3	3	M	2	2	L
Soil, surface water and groundwater pollution from the ineffective containment of the piggery wastewater	3	4	H	2	3	M
Delays, non-compliances to the EA and EMP and harm to the environment due to ineffective planning	3	3	M	2	2	L
General Environment						
Harm to the environment in general (including pollution of soil and water resources, as well as harm to employees)	3	4	H	2	2	L
Geology and Soil						
Exposure to soil erosion	3	4	H	2	2	L
Degradation and loss of valuable resource (topsoil) due to exposure of topsoil to the elements.	3	3	M	2	2	L
Ineffective vegetation establishment may lead to erosion of bare areas.	3	3	M	2	2	L
Atmosphere and Noise						
Degradation of ambient air quality and nuisance due to odour generation from the piggery	4	3	H	3	2	M
Degradation of ambient air quality due to dust and exhaust emission generation	3	3	M	2	2	L
Noise generated by the piggery	3	2	M	2	2	L
Soil, surface water, stormwater and groundwater						
Soil and surface water pollution as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete	3	3	M	2	3	M
Soil and surface water pollution through contaminated wash water	3	3	M	2	2	L
Soil, surface water and groundwater pollution due to poor waste management	3	4	H	2	3	M
Soil, surface water and groundwater pollution due to unsanitary conditions onsite.	2	3	M	2	2	L
Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances	3	3	M	2	3	M
Hydrocarbon pollution of soil, surface water and groundwater	3	3	M	2	2	L

[1] Probability
[2] Magnitude
[3] Severity

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
Soil, surface water and groundwater pollution from the piggery, its wastewater management practices and mortality management	3	4	H	2	3	M
Soil, surface water and groundwater pollution due to the contamination of clean stormwater runoff	3	3	M	2	2	L
Soil, surface water and groundwater pollution due to the incorrect management of wastewater on site	3	4	H	2	3	M
Vegetation						
Exposure of soil to erosion due to vegetation removal	3	2	M	2	2	L
Harm to threatened or protected plant species	3	2	M	2	1	L
Spread of alien invasive plant species from the transformed areas to the natural vegetation	3	2	M	2	2	L
Edge effects from the construction and operational area could degrade vegetation outside the development footprint	3	2	M	2	1	L
Fauna						
Disturbance of fauna due to damage to mature wooded Central Sandy Bushveld	4	2	M	3	2	M
Heritage and Palaeontology						
Disturbance and destruction of sites, features or artefacts of archaeological and/or historical importance	1	3	L	1	2	L
Disturbance and destruction of fossils or bedrock of palaeontological sensitivity	2	2	L	1	2	L
Sensitive Landscapes – Wetlands						
Invasions of alien plants can impact on hydrology by reducing the quantity of water entering a wetland and outcompete natural vegetation, decreasing the natural biodiversity	2	2	L	1	1	L
Loss of sensitive biota in wetlands and reduction in wetland function due to the discharge of solvents and other industrial chemicals, leakage of fuel/oil and the disposal of sewage during operational and decommissioning activities	3	3	M	3	2	M
Biosecurity						
Increase in the presence of pests such as flies, mice and rats	3	3	M	2	2	L
Potential injury to employees working with biological waste	2	3	M	1	2	L
Unauthorised access to the site can compromise its biosecurity buffer	2	3	M	1	2	L
Death of pigs at the piggery, including mass mortalities and the potential spread of the disease to other farms	3	4	H	2	3	M
Resource Usage						
Wastage or depletion of valuable resources (electricity and groundwater) due to inefficient or redundant usage	3	3	M	2	2	L

Potential Impact	Environmental Significance Pre Mitigation			Environmental Significance Post Mitigation		
	P[1]	M[2]	S[3]	P	M	S
Infrastructure						
Wear of access roads, accidents on access roads, unpermitted transport of pigs and loss of pigs being transported on access roads	3	3	M	1	2	L
Visual impact upon receptors surrounding the piggery	3	3	M	2	2	L

Appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the construction and operational phases of the development. An Environmental Management Programme (EMP) has been compiled, with the aim of serving as a working document in order to manage and/or mitigate the identified potential impacts. Refer to Addendum A for a copy of the EMP.

The main mitigation measures identified in this Basic Assessment include the following:

- Compliance to the Environmental Authorisation and Environmental Management Programme must form part of agreements with all construction or operational phase contractors;
- The contractor is to ensure that all employees, including subcontractors and their employees, attend onsite Environmental Awareness Training prior to commencing work onsite;
- A complaints register must be maintained on site. The register must record the following: Date when the complaint was received, name of the person who reported the complaint, details of the complaint and when and how the concern was addressed;
- Retain vegetation and soil in position as long as possible. It should only be removed immediately ahead of construction;
- Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover;
- Cement may only be mixed on an impermeable surface (not bare soil);
- Sufficient waste bins, skips or bulk containers should be installed. Containers must be available on site at all times;
- Skips or bulk containers should be removed to a licensed landfill site on a regular basis. No build-up of waste is permitted onsite;
- Sufficient ablution facilities shall be provided – minimum of 1 toilet per 15 workers;
- Obtain the material safety data sheet of each of the hazardous chemical substances;
- Immediately clean all spillage of fuels, lubricants and other petroleum based products;
- Drip trays are to be utilised during greasing and re-fuelling of machinery and to contain incidental spills and pollutants;
- The wastewater irrigation handling system must regularly be maintained and inspected to ensure that it is in working condition. This will prevent the development of leaks;
- Protect all areas susceptible to erosion (especially stockpiled soils and materials such as sand and tar) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas;
- After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction;
- Alien invasive species, that were identified within the study area should be removed (prioritizing category 1 species), prior to the construction. Be removing these species, the spread of seeds into disturbed soils will be prevented which could thus have a positive impact on the surrounding natural vegetation;

- All alien seedlings and saplings must be removed as they become evident for the duration of construction;
- Demarcation of intended footprints and organisation of all successive activities within the available footprints; and
- Mortalities must be removed from the houses on a daily basis.

Based on the outcomes of the Environmental Impact Assessment conducted as part of this Basic Assessment as well as the alternatives assessment, the following recommendations are made:

1. **The proposed project (the construction of the Humphries Boerdery Wean-to-Finish Site) should be authorised and allowed to proceed.**
2. The mitigation measures proposed in this report and the draft Environmental Management Programme must be implemented during all phases of the proposed project.
3. A communications pathway must be established that would allow the designated ECO to accept and deal with stakeholder complaints.
4. Proposed mitigation measures should be incorporated as far as possible into the operational plan for the piggery unit.
5. Strict monitoring and enforcement of requirements of the EMP must be undertaken to ensure that contractors and operators adhere to these requirements.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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DEFINITIONS

Baconer

A market pig with weight ranging between 70 and 100 kg (ARMCANZ/ANZECC, 1999).

Biodegradable Industrial Wastewater

Wastewater that contains predominantly organic waste arising from industrial activities and premises including:

- Milk processing;
- Manufacture of fruit and vegetable products;
- Sugar mills;
- Manufacture and bottling of soft drinks;
- Production of alcohol and alcoholic beverages in breweries, wineries or malt houses;
- Manufacture of animal feed from plan or animal products;
- Manufacture of gelatine and glue from hides, skin and bones;
- Abattoirs;
- Fish processing; and
- Confined animal feeding operations.

Building and Demolition Waste

Means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition [NEM:WA, (Act No. 59 of 2008)].

Composting

A controlled biological process in which organic materials are broken down by micro-organisms (DEA, 2014).

Demography

The scientific study of human population, especially, with reference to their size, structure and distribution.

Domestic Waste

Means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes [NEM:WA, (Act No. 59 of 2008)].

Environment

The surroundings (biophysical, social and economic) within which humans exist and that are made up of

- the land, water and atmosphere of the earth;
- micro-organisms, plant and animal life;
- any part or combination of (i) and (ii) and the interrelationships among and between them; and
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Aspects

Elements of an organization's activities, products or services that can interact with the environment.

Environmental Degradation

Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage; usually refers to damage occurring accidentally or intentionally as a result of human activities.

Environmental Impacts

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Environmental Impact Assessment

A study of the environmental consequences of a proposed course of action.

Environmental Impact Report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Environmental impact

An environmental change caused by some human act.

General Waste

Means waste that does not pose immediate hazard or threat to health or to the environment, and includes-

- Domestic waste;
- Building and demolition waste;
- Business waste; and

- Inert waste [NEM:WA, (Act No. 59 of 2008)].

Hazardous waste

Means any waste that contains organic or inorganic elements compounds that may, owing to the inherent physical, chemical or toxicological characteristics or that waste, have detrimental impact on health and the environment [NEM:WA, (Act No. 59 of 2008)].

Land application

The spraying of wastewater sludge onto the surface of land to condition the soil and fertilise crops and/or vegetation grown on the land (WRC, 2006).

Land use

The various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Pollution

Pollution means any change in the environment caused by-

- Substances;
- Radioactive or other waves; or
- Noise, odours, dust or heat,

emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or wellbeing or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future [NEM:WA, (Act No. 59 of 2008)].

Pollution Prevention

Any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public Participation Process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Registered Interested and Affected Party

In relation to an application, means an interested and affected party whose name is recorded in the register opened for that application.

Topography

Topography, a term in geography, refers to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

All of the plants growing in and characterizing a specific area or region; the combination of different plant communities found there.

Waste

As per the definition of the National Environmental Management Waste Act, Act 59 of 2008 - means any substance, whether or not that substance can be reduced, re-used, recycled and recovered—
(a) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; 3(b) which the generator has no further use of for the purposes of production; (c) that must be treated or disposed of; or (d) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— (i) a by-product is not considered waste; and 3(ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.

Weaner

A piglet that has been removed from its mother at two to five weeks and frown to between 20 and 30kg (ARMCANZ/ANZECC, 1999).

ABBREVIATIONS

BAR	-	Basic Assessment Report
BID	-	Background Information Document
CRR	-	Comments Response Report
DWS	-	Department of Water and Sanitation
EAP	-	Environmental Assessment Practitioner
ECA	-	Environmental Conservation Act of 1989
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
EMF	-	Environmental Management Framework
EMP	-	Environmental Management Programme
GN	-	Government Notice
I&AP	-	Interested and Affected Party
LEDET	-	Limpopo Department of Economic Development, Environment and Tourism
NEMA	-	National Environmental Management Act (Act No. 107 of 1998), as amended
NEM:WA	-	National Environmental Management: Waste Act (Act No. 59 of 2008)
NHRA	-	National Heritage Resources Act (Act No. 25 of 1999)
NWA	-	National Water Act (Act No. 36 of 1998)
R	-	Regulation
SAHRA	-	South African Heritage Resources Agency

1. INTRODUCTION

This Basic Assessment Report forms part of an application for environmental authorisation for the Humphries Boerdery Wean-to-Finish Site project near Bela-Bela. The application is made in terms of the 2014 EIA Regulations under the National Environmental Management Act 107 of 1998 (NEMA).

The application process is undertaken on behalf of the applicant, Humphries Boerdery (Pty) Ltd, by Shangoni Management Services (Pty) Ltd (hereafter Shangoni). Shangoni was appointed as independent environmental practitioner, to assist the applicant in undertaking the process as prescribed in the mentioned environmental legislation.

An application to undertake a Basic Assessment process will be submitted to the identified competent authority, Limpopo Department of Economic Development, Environment and Tourism (LEDET). The Department will subsequently register the project and the Basic Assessment Report, which have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority, as per Section 19 of the EIA Regulations, 2014, will be submitted to the competent authority. All the findings from the basic assessment process are included in this report.

This Basic Assessment Report is divided into the following parts:

- Part 1: Introduction
- Part 2: Applicable legislation and guidelines
- Part 3: Project Description
- Part 4: Nature and extent of the environment affected by activity
- Part 5: Public Participation Process
- Part 6: Identified Alternatives
- Part 7: Need and Desirability for the Activity
- Part 8: Environmental Impact Assessment
- Part 9: Environmental Impact Statement
- Part 10: Conclusion

1.1 Process followed

1.1.1 Objectives of the Basic Assessment process

The objective of the basic assessment process is to, through a consultative process-

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives,

(d) through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine-

(i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and

(ii) 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;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to-

(i) identify and motivate a preferred site, activity and technology alternative;

(ii) identify suitable measures to avoid, manage or mitigate identified impacts; and

(iii) identify residual risks that need to be managed and monitored.

1.1.2 Methodology applied to conducting the Basic Assessment process

The figure below indicates the methodology that was applied in conducting the basic assessment process.

Application- and Basic Assessment Phases	**Public Participation and Stakeholder Consultation**
• BAR Report and EMPr • BAR Application form • Project Reference number	• Initial communication with applicant and desktop assessment. • Development and maintenance of I&AP's and Stakeholder register / database • Background Information Document distributed, newspaper advertisement and site notices placed • Telephonic and electronic notifications • I&AP's and Stakeholder comments recorded • Submission of Application form to responsible Government Authority • Registration of project by responsible Government Authority (LEDET) • Letter to inform I&APs and Stakeholders of the availability of the BAR • Incorporation of comments into BAR • Finalisation of BAR and submission to Competent Authority

Figure 1: Methodology applied to conducting the basic assessment process

1.1.3 The Basic Assessment Report in terms of the requirements of NEMA

Appendix 1 of the EIA Regulations, 2014 under NEMA, indicates aspects that must be included in the Basic Assessment Reports (BARs). The table below indicates the parts where information has been provided as part of this BAR.

Table 2: The BAR in terms of the EIA Regulations, 2014, under the NEMA

Regulation No:		Description	Basic Assessment Report Part
GNR982 Appendix 1 3 (1) paragraph (a)	(i)	The Environmental Assessment Practitioner (EAP) who prepared the report	Part 3 & Appendix G
	(ii)	the expertise of the EAP including a curriculum vitae	
GNR982 Appendix 1 3 (1) paragraph (b)	(i)	The location of the activity including the 21 digit Survey General code of each cadastral land parcel	Part 3
	(ii)	Where available, the physical address and farm name	
	(iii)	Where the required information in items (i) & (ii) is not available, the coordinates of the boundary of the property or properties.	
GNR982 Appendix 1 3 (1) paragraph (c)		A plan which locates the proposed activity or activities applied for at an appropriate scale	Part 3
	(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	
GNR982 Appendix 1 3 (1) paragraph (d)		A description of the scope of the proposed activity including -	Part 3
	(i)	All listed and specified activities triggered;	
	(ii)	A description of the activities to be undertaken, including associated structures and infrastructure;	
GNR982 Appendix 1 (1) paragraph (e)		A description of the policy and legislative context within which the development is proposed including	Part 2
	(i)	an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the preparation of the report and	
	(ii)	How the proposed activity compiles with and responds to the legislation and policy context, plans, guidelines, tools, frameworks, and instruments;	
GNR982 Appendix 1 3 (1) paragraph (f)		A motivation for the need and desirability for the proposed development including the need and desirability of the	Part 7

Regulation No:		Description	Basic Assessment Report Part
		activity in the context of the preferred location;	
GNR982 Appendix 1 3 (1) paragraph (g)		A motivation for the preferred site, activity and technology alternative;	Part 6
GNR982 Appendix 1 3 (1) paragraph (h)		A full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	Part 4, 5 & Part 6 Part 8
	(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;	Part 6 & 10
	(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 alternative, including preferred location of the activity;	

Regulation No:		Description	Basic Assessment Report Part
GNR982 Appendix 1 3 (1) paragraph (i)		A full description of the process undertaken to identify, assess and rank the impacts the activity will impose of the preferred location through the life of the activity, including	Part 8
	(i)	A description of all the environmental issues and risks that were identified during the environmental process and	
	(ii)	An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
GNR982 Appendix 1 3 (1) paragraph (j)		An assessment of each identified potentially significant impact and risk, including	
	(i)	Cumulative impacts	
	(ii)	The nature, significance and consequence 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;	
GNR982 Appendix 1 3 (1) paragraph (k)		Where applicable a summary of the findings and impacts 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	Part 8
GN 982 Appendix 1 3 (1)		An environment impact statement which contains	Part 9
	(i)	A summary of the key findings of the environmental impact assessment	
	(ii)	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;	
GNR982 Appendix 1 3 (1) paragraph (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	Part 8

Regulation No:		Description	Basic Assessment Report Part
		development for inclusion in the EMPr	
GNR982 Appendix 1 3 (1) paragraph (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;	Part 10
GN982 Appendix 1 3 (1) paragraph (o)		A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	Part 10
GN982 Appendix 1 3 (1) paragraph (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;	Part 10
GN982 Appendix 1 3 (1) paragraph (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;	Part 9
GN982 Appendix 1 3 (1) paragraph (r)		An undertaking under oath or affirmation by the EAP in relation to:	Page 4
	(i)	The correctness of the information provided in the reports;	Page 4
	(ii)	The inclusion of comments and inputs from stakeholders and I&AP's;	Part 5
	(iii)	The inclusion of inputs and recommendations from the specialist reports where relevant; and	Part 9
	(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	
GN982 Appendix 1 3 (1) paragraph (s)		Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Part 9
GN982 Appendix 1 3 (1) paragraph (t)		Any specific information that may be required by the competent authority, and	Part 1
GN982 Appendix 1 3 (1) paragraph (u)		Any other information required in terms of section 24 (4) (a) and (b) of the Act.	Part 1
		24 (4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment-	Part 8
	(a)	must ensure, with respect to every application for an environmental authorisation-	Part 1
	(i)	coordination and cooperation between organs of state in the consideration of assessments where an activity falls	Part 3

Regulation No:		Description	Basic Assessment Report Part
		under the jurisdiction of more than one organ of state;	
	(ii)	that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;	Part 9
	(iii)	that a description of the environment likely to be significantly affected by the proposed activity is contained in such application.	Part 4
	(iv)	investigation of the potential consequences for or impacts on the environment of the activity an assessment of the significance of those potential consequences or impacts; and	Part 8
	(v)	public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and	Part 5
	(b)	must include, with respect to every application for an environmental authorisation and where applicable-	Part 8
	(i)	investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;	Part 8
	(ii)	investigation of mitigation measures to keep adverse consequences or impacts to a minimum;	Part 8
	(iii)	investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;	Part 8
	(iv)	reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	Part 10
	(v)	investigation and formulation of arrangements for the monitoring and management of consequences for or	Part 9.4

Regulation No:		Description	Basic Assessment Report Part
		impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;	
	(vi)	consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection	Part 9.2
	(3); and (vii)	provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Part 2

** No specific requests have been received from the competent authorities to date.*

The BA process will be undertaken in accordance with Appendix 1 of the 2014 EIA Regulations.

2. APPLICABLE LEGISLATION AND GUIDELINES

The table below provides an indication of the main legislation, policies and / or guidelines applicable to the Humphries Boerdery Wean-to-Finish Site project.

Table 3: Applicable legislation, policies and / or guidelines

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline	Reference where in the document it is applied
Laws of General Application			
The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)	-	To establish a Constitution with a Bill of Rights for the RSA.	Section 5
Environment Conservation Act, 1989 (Act 73 of 1989 as amended)	Limpopo Department of Economic Development, Environment and Tourism	To control environmental conservation.	Section 4.5
National Environmental Management Act, 1998 (Act 107 of 1998)	Limpopo Department of Economic Development, Environment and Tourism	To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.	Executive summary, Sections 1, 3 and 5
Promotion of Access to Information Act, 2000 (Act 2 of 2000 as amended)	-	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.	Section 5.2
Air Quality and Noise			
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Waterberg District Municipality	To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.	Section 4.11

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline	Reference where in the document it is applied
Water Management			
National Water Act (NWA), 1998 (Act No 36 of 1998)	Department of Water and Sanitation	To provide for fundamental reform of the law relating to water resources.	Sections 4.7 and 4.8
Waste Management			
National Environmental Management: Waste Act (Act No 59 of 2008)	National Department of Environmental Affairs	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.	Section 8
Biodiversity			
National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)	Limpopo Department of Economic Development, Environment and Tourism	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998.	Section 4.5
Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)	Limpopo Department of Agriculture and Rural Development	To provide for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.	Section 4
Agricultural Pest Act, 1983 (Act No 36 of 1983 as amended) – GN R276 of 5 March 2004	Limpopo Department of Agriculture and Rural Development	To regulate plants, plant products and other regulated articles when imported into South Africa.	Section 8.4
Soil and Land Management			
National Environmental Management Act, 1998 (Act	Limpopo Department of Economic Development,	To provide for the integrated management	Section 4.1

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline	Reference where in the document it is applied
107 of 1998).	Environment and Tourism	of the environment and to regulate the 'Duty of Care' Principle.	
Environment Conservation Act, 1989 (Act 73 of 1989 as amended)	Limpopo Department of Economic Development, Environment and Tourism	To control environmental conservation.	Section 4.1
Heritage and Archaeological Resources			
National Heritage Resources Act No 25 of 1999 (Act No 25 of 1999 as amended)	South African Heritage Resources Agency	To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations	Section 4.10
Protected Areas			
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003 as amended)	Limpopo Department of Economic Development, Environment and Tourism	To provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.	Section 4
Planning of New Activities			
National Environmental Management Act, 1998 (Act 107 of 1998)	Limpopo Department of Economic Development, Environment and Tourism	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.	Sections 1, 3, 5 and 6
EIA Regulations R 983, R 984, R 985, dated December 2014) under the NEMA, 1998	Limpopo Department of Economic Development, Environment and Tourism	To regulate and control the authorisation of certain listed activities.	Sections 1, 3, 5 and 6

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline	Reference where in the document it is applied
Waterberg District Municipality Integrated Development Plan	Waterberg District Municipality	To provide a strategic programme of action aimed at setting short, medium and long term strategic and budget priorities to create a development platform.	Section 7
Bela-Bela Local Municipality Integrated Development Plan	Bela-Bela Local Municipality	Management tool for assisting municipalities in achieving their development mandates.	Section 7

3. PROJECT DESCRIPTION

Humphries Boerdery wishes to establish a wean-to-finish site. The development will entail the following:

- The development of a wean-to-finish unit where weaner piglets are grown until they are ready for slaughter. These pigs are called baconers.
- The construction of seven (7) wean-to-finish platforms. Each platform will have one (1) house and each house will have one (1) room (therefore a total of 7 rooms). Each room houses 810 wean-to-finish pigs. The total capacity within the wean-to-finish rooms is therefore 5 670 baconers. The dimensions of one platform: 12m x 67.5m (810m^2) x 7 platforms = 5 670m^2.
- The total footprint size of all the wean-to-finish platforms is therefore 5 670m^2 (0.567ha).
- The total development footprint, including the platforms and open spaces between and surrounding the platforms is: 205m x 100m = 20 500m^2 (2.05ha).
- The construction of an office block that will include a store room and ablution facilities. The office block will have the following dimensions: 5m x 10m (50m^2).

The following describes the basic process that will be followed to raise the baconer pigs:

- Weaner piglets will be delivered to the wean-to-finish unit at three weeks of age. Each fourth week, 810 weaner piglets will be delivered.
- Once the pigs are 21-24 weeks old, they will be collected and taken to an abattoir for slaughter.

Water Use

Existing boreholes present on the property will be used to supply water to the piggery for domestic use, drinking water, cooling water, to pre-charge the cement wastewater canals and to clean the houses.

The piggery will require 5.59 litres of water per pig per day. A total of 5 670 pigs will be housed at the piggery resulting in a total daily requirement of 31 696 litres of water per day.

Water Storage

Two reservoirs with a capacity of 10 000 litres each, will be installed on site for the storage of water to be used at the piggery unit.

Wastewater Handling Practices

A deep pit, flush system will be utilised for the management of pig waste from the houses. A concrete sump will be constructed under the piggery houses for the collection of wastewater. A paddle system will be used to mix the wastewater generated in the pig houses, from where the wastewater will be channelled to the existing biodigester on site. The biodigester is used to treat wastewater generated on site.

After wastewater passed through the biodigester, the liquid and solid fractions of the wastewater will be separated. The solid fraction of the wastewater will be dried and used as compost. The liquid fraction of wastewater generated on site will comply with the definition of "biodegradable industrial wastewater" as defined in GN 665 of 6 September 2013 under the National Water Act, 1998 (Act No. 36 of 1998) and can therefore be re-used for irrigation onto land as long as the following water quality standards are adhered to:

Table 4: Water Quality Standards for the re-use of Wastewater for Irrigation on Land

Variable	Limit
pH	Not less than 6 or more than 9 pH units
Electrical Conductivity	Not exceeding 200 milliSiemens per metre (mS/m)
Chemical Oxygen Demand (COD)	Does not exceed 400 mg/l after removal of algae
Faecal Coliforms	Does not exceed 100 000 per 100ml
Sodium Adsorption Ratio (SAR)	Does not exceed 5 for biodegradable industrial wastewater

Slurry tankers will collect wastewater from the collection pit from where it will be irrigated onto land.

Water monitoring

Groundwater will be monitored to assess its inherent quality, seasonal variation and to ensure no impacts occur due to the construction or operation of the piggery unit. Surface water will be monitored against the same parameters, namely pH, electrical conductivity, chemical oxygen demand, faecal coliforms and sodium adsorption ratio. The raw wastewater from the piggery houses and the liquid fraction (after separation in the screw press) will be monitored to assess nutrient content.

Biosecurity

The wean-to-finish unit will be fenced and will have one access point to control entry into the facility. Vehicles will load and unload pigs and feed from outside the boundary fence. A portable disinfectant sprayer will also be used to clean any vehicles accessing the site.

Mortality management

Mortalities occurring on site will be removed from the houses on a daily basis. Mortalities are also collected and taken to a nearby crocodile farm daily.

Sewage

Human sewage will be collected in a septic tank which will be siphoned off when full by outside contractors and disposed at the Bela-Bela sewage facility.

3.1 Details of the project applicant

Name of Applicant	Humphries Boerdery (Pty) Ltd
Postal Address	PO Box 431, Bela-Bela, 0480
Telephone No.	014 740 0098
Fax No.	086 651 7543
Farm name and portion on which the activities take place	Portion 50 (remaining extent) of the farm Tweefontein 463 KR
Title Deed Number and 21 Digit Code	T25217/1995 T0KR00000000046300050
Co-ordinates of operation	24◦50'36.36" S, 28◦23'6.90" E

3.2 Appointed Environmental Assessment Practitioner

Name of firm	Shangoni Management Services	
Postal address	PO Box 74726 Lynwood Ridge 0040	
Telephone No.	012 807 7036	
Fax	012 807 1014	
E-mail	karien@shangoni.co.za	
Team of Environmental Assessment Practitioners on project		
Name	Qualifications & experience to conduct the EIA	Responsibility
Mr Jan Nel	• MSc Environmental Management (University of the Free State) • More than 20 years' experience conducting Environmental Impact Assessments and Waste Management License Applications	Project Director
Ms Karien Venter	• B.Sc. (Hons) Environmental Management • More than 1.5 years' experience conducting Environmental Impact Assessments and Waste Management License Applications.	EAP

** Detailed CV's for the project team are attached (Appendix G).*

Jan Nel – Project Director

Jan has been actively involved or the past 16 years in environmental management within the mining industry, providing assistance with EMP Compliance, Environmental Impact Assessments (EIA).

Financial Provision Calculations, Closure Plans, Rehabilitation Plans, Environmental Management Programme Reports (EMP) and EMP Performance Assessments. He is further experienced in environmental management through third party certification audits as well as Environmental Management System (EMS) implementation and has in excess of 8000 audit hours to date. Jan is also the vice chairman of TC 207 in South Africa.

Karien Venter – Environmental Practitioner

Karien obtained a B.Sc. degree in Biological Science with Zoology and Physiology as majors. She went on to complete her B.Sc. Honors degree in Environmental Science at the North-West University majoring in Aquatic Ecosystem Health and Environmental Management. She is responsible for conducting Waste Management Licence Applications and Environmental Impact Assessments (EIAs) at Shangoni.

3.3 Current situation

An established pig farm is present on the site. The pig farm currently houses 17 500 pigs in 29 houses. The farm is equipped with a biodigester that enables Humphries Boerdery to treat the wastewater generated on site.

Table 5: Owner(s) of the project property

Farm Name	Title deed	Owner
Portion 50 (remaining extent) of the farm Tweefontein 463 KR	T25217/1995	Humphries Boerdery (Willie Humphries Trust)

3.4 Proposed EIA listed activity (ies)

The following listed activities in terms of GNR 983 and 985 of 4 December 2014 are being applied for:

Table 6: Listed activities in terms of GNR 983 and 985 of 4 December 2014

Number and date of the relevant notice	Activity No	Description
GNR 983 Listing Notice 1 4 December 2014	4(ii)b	The development and related operation of facilities or infrastructure for the concentration of animals for the purpose of commercial production in densities that exceed- **(ii) 8 square metres per small stock unit and;** **b. more than 250pigs per facility excluding piglets that are not yet weaned;**
		The construction and operation of a wean-to-finish unit. The unit will have a capacity to house 5 670 wean-to-finish pigs, at any point in time.

GNR 983 Listing Notice 1 4 December 2014	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) The undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan.
		The total development footprint, including piggery houses, office, ablution facilities, store room and open spaces between and surrounding the houses will be approximately 2.05ha. Therefore, more than 1 hectare, but less than 20 hectares of indigenous vegetation will be cleared. The vegetation type is Central Sandy Bushveld.

3.4.1 Proposed locality

The proposed site for the Humphries Boerdery Wean-to-Finish Site is located on the remaining extent of Portion 50 the farm Tweefontein 463 KR, situated in close proximity to Bela-Bela.

The proposed site is situated within the Bela-Bela Local Municipalities' jurisdiction. This local municipality forms part of the Waterberg District Municipality, located within the Limpopo province.

Table 7: Administrative and water management boundaries

Province	Limpopo Province
District Municipality	Waterberg District Municipality
Local Municipality	Bela-Bela Local Municipality
Ward	Ward 7
Department of Mineral Resources (DMR) Local Office	-
Department of Water Affairs (DWA) Local Office	Limpopo
Catchment Zone	A61C
Water Management Area	Limpopo

Table 8: Direction & distance to the nearest town(s)

Direction from site	Distance from site	Closest town
West	15km	Bela-Bela
North	17km	Modimole

The site locality map is given below as Figure 2 and is attached in Appendix A. Site photographs are also provided below (refer to Figure 3).

3.4.2 Land tenure and use of immediately adjacent land

The properties adjacent to the proposed site for the wean-to-finish unit are used for agricultural activities such as chicken farming and crop production as well as rural residential activities.

The land owners of the farm portions immediately adjacent to the proposed wean-to-finish site are listed in Table 9 below. Refer also to Part 5 for more detail regarding the Public Participation Process.

Table 9: Owners of properties adjacent to the proposed site/farm

Farm Name	Title deed	Owner
Portion 1 (Remaining Extent) of the farm Tweefontein 463 KR	T23470/1978	Frederik Pieter Minnaar
Portion 13 of the farm Tweefontein 463 KR	T30275/1996	Geordon Properties CC
Portion 40 (Remaining Extent) of the farm Tweefontein 463 KR	T25217/1995	Willie Humphries Trust
Portion 42 (Remaining Extent) of the farm Tweefontein 463 KR	T60824/2001	Talco Promotions CC
Portion 43 of the farm Tweefontein 463 KR	T6576/2014	HMJ Technologies CC
Portion 44 (Remaining Extent) of the farm Tweefontein 463 KR	T39038/2015	Marinette & Hendrik Petrus Jacobus Goosen
Portion 47 of the farm Tweefontein 463 KR	T56085/2015	Thomas Stephens van Staden
Portion 52 of the farm Tweefontein 463 KR	T65173/1997	Bosveld Distriksraad
Portion 54 of the farm Tweefontein 463 KR	T62706/2010	Willie Humphries Trust
Portion 56 of the farm Tweefontein 463 KR	T6576/2014	HMJ Technologies CC
Portion 67 of the farm Tweefontein 463 KR	T85646/1995	Adinvale Farming Estates (Pty) Ltd
Portion 90 of the farm Tweefontein 463 KR	T56494/1999	Edward Charles Lightfoot
Portion 112 of the farm Tweefontein 463 KR	T28658/2007	SANRAL
Portion 115 of the farm Tweefontein 463 KR	T28657/2007	SANRAL
Portion 116 of the farm Tweefontein 463 KR	T114808/2005	Hagne Bush Lapa (Pty) Ltd
Portion 124 of the farm Tweefontein 463 KR	T38443/2008	Shona Bosveld CC
Portion 130 of the farm Tweefontein 463 KR	T45186/2000	Omewachem CC
Portion 131 of the farm Tweefontein 463 KR	T50628/2003	Johan Charl de Beer
Portion 132 of the farm Tweefontein 463 KR	T75665/2014	Josta Shimane Dladla Thato Bareng Dladla
Portion 0 (Remaining Extent) of the farm Tweefontein 462 KR	T57445/1992	Adinvale Farming Estates (Pty) Ltd
Portion 62 of the farm Tweefontein 462 KR	T16614/2009	SANRAL

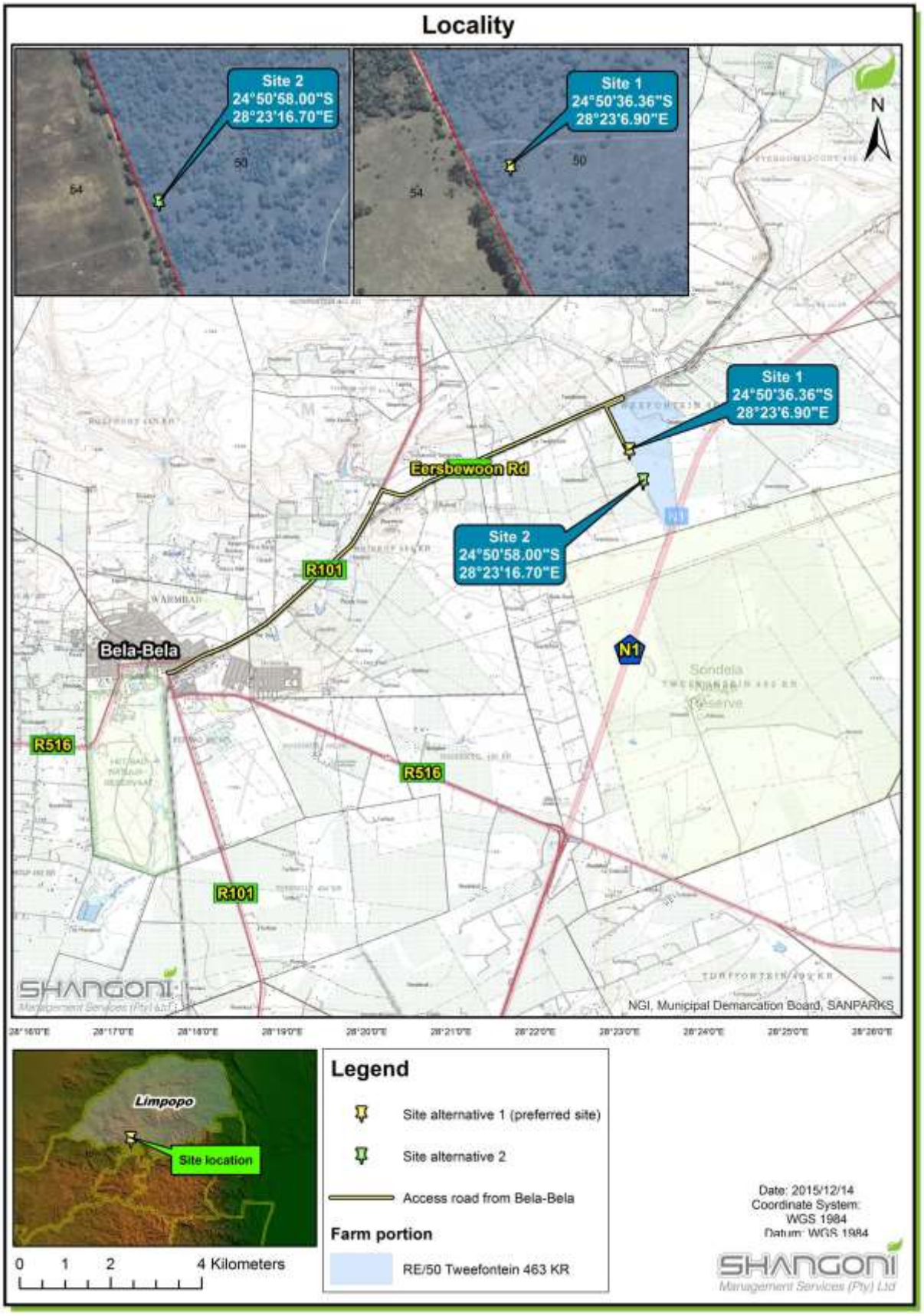


Figure 2: Locality of the site


a


b


c


d


e


f


g


h


i


j


k


l

Figure 3 (a-l): Site Photographs

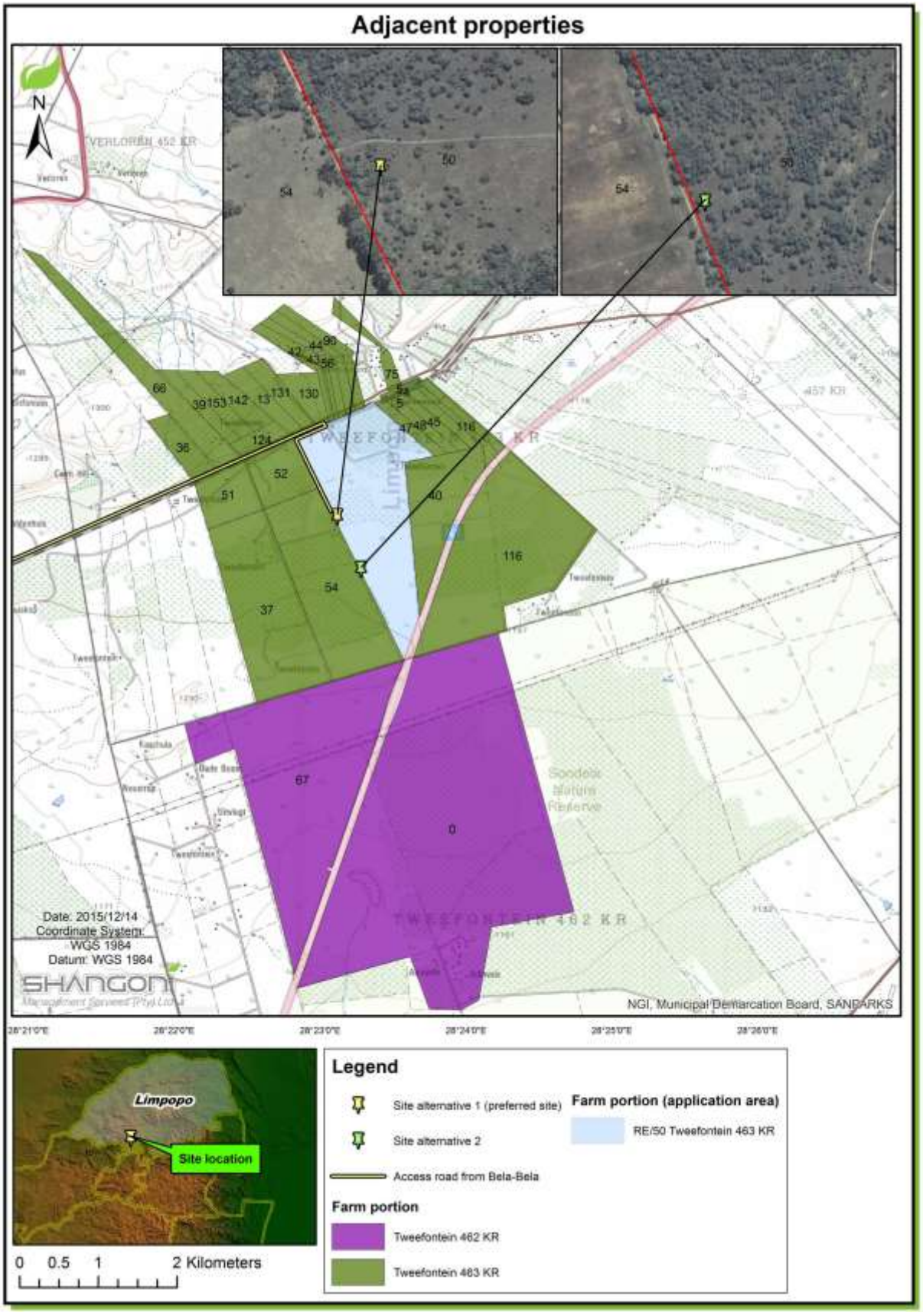


Figure 4: Properties adjacent to the site

4. NATURE AND EXTENT OF THE ENVIRONMENT AFFECTED BY ACTIVITY

4.1 Geology and Soil

The geology and soils underlying the site and surrounding areas are shown in the figures below. The site is underlain with arenite and siltstone from the Clarens Supergroup (DWA, 2010).

The soil types present at the site are undifferentiated structureless soils associated with soil classes 1 to 4. These soils have favourable physical properties but may have low base status, restricted soil depth, excessive or imperfect drainage and high erodibility (SANBI, 2009).

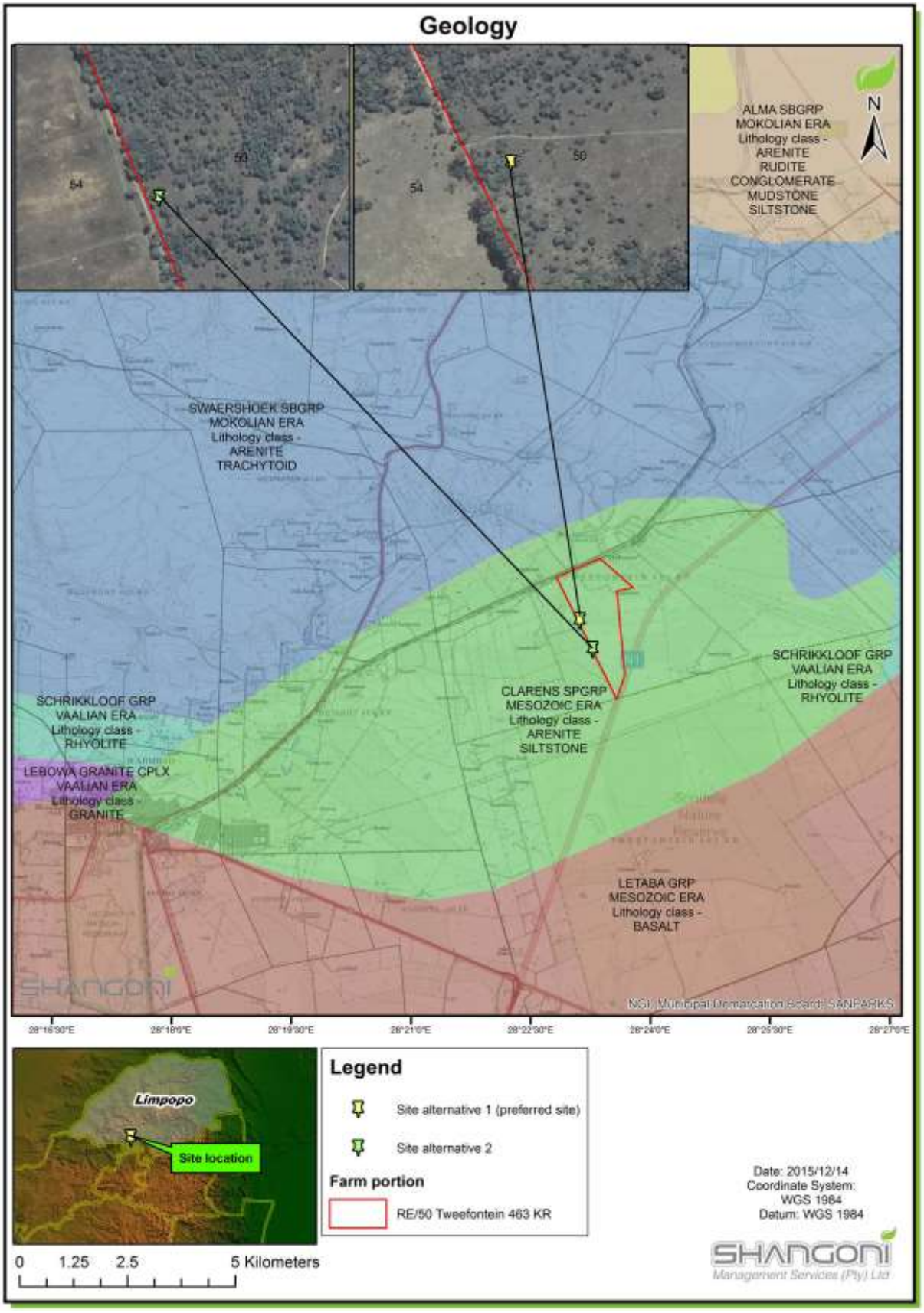


Figure 5: Geology underlying the site

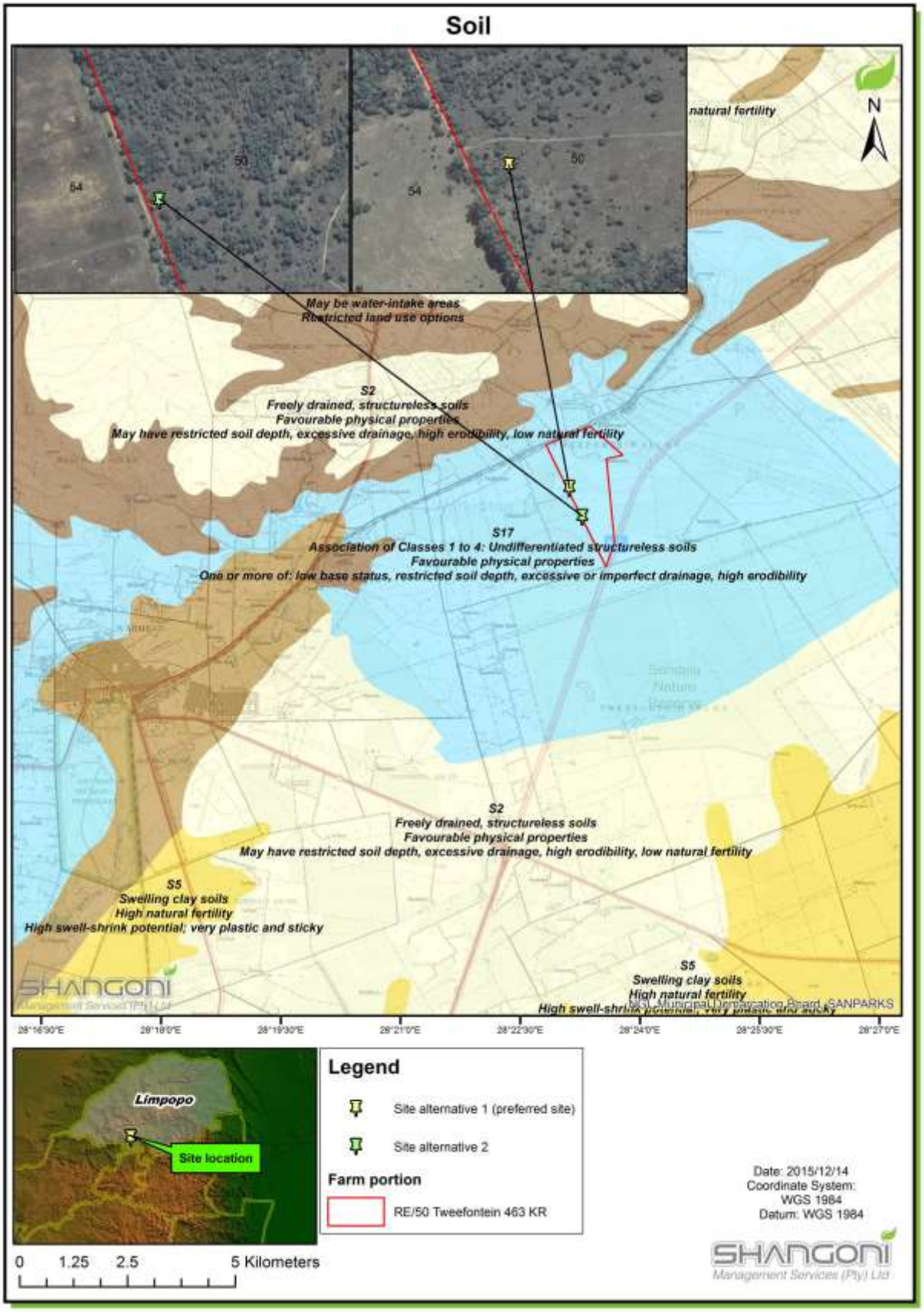


Figure 6: Soil types present at the site

4.2 Regional climate

4.2.1 Rainfall

The site is located within a summer rainfall area. According to the AGIS Comprehensive Atlas (2007), the mean annual rainfall at the site ranges between 401 and 800mm per annum. The figure below shows the long term mean annual rainfall for the study area.

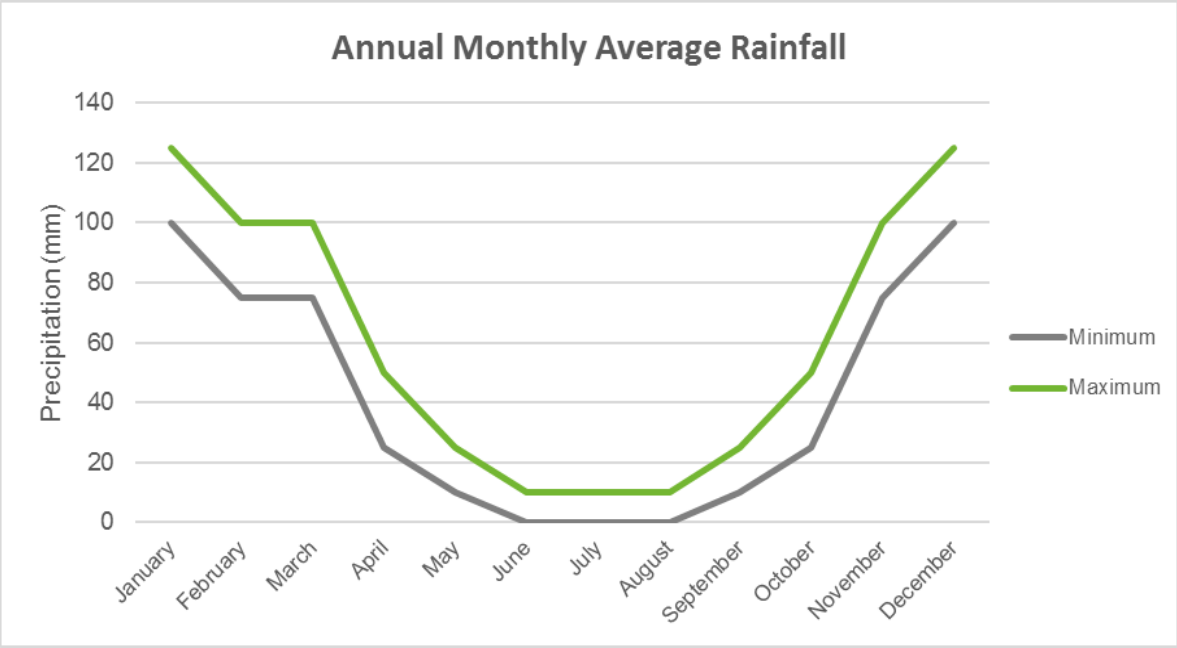


Figure 7: Annual monthly average rainfall at the site.

The table below shows the rainfall data recorded by the weather station A2E014 near the site.

Table 10: Monthly average rainfall recorded by weather station A2E014.

Month	Precipitation (mm)
January	139.0
February	81.7
March	76.8
April	37.0
May	7.6
June	1.8
July	2.0
August	4.9
September	13.4
October	58.4
November	104.6
December	114.6
Average	**642.2**

4.2.2 Temperature

The maximum mean annual temperature for the site ranges between 27.1°C and 29°C and the minimum mean annual temperature ranges between 4.1°C and 6°C (AGIS, 2007). The figure below shows the long-term mean annual temperature for the site.

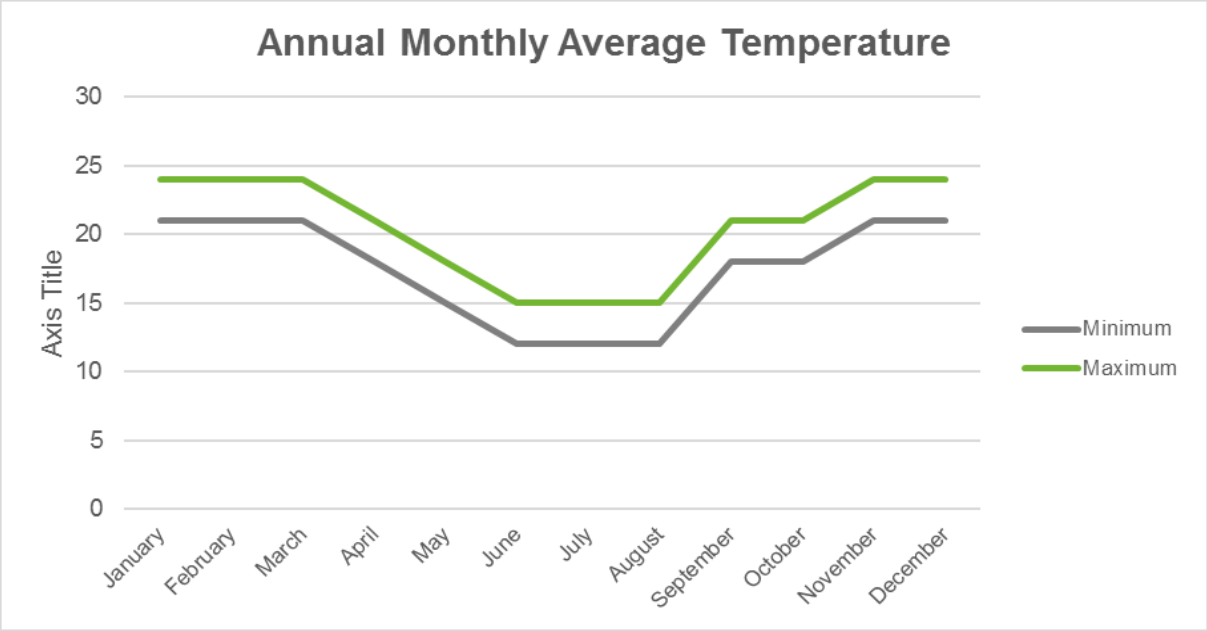


Figure 8: Annual monthly average temperature at the site.

4.2.3 Evaporation

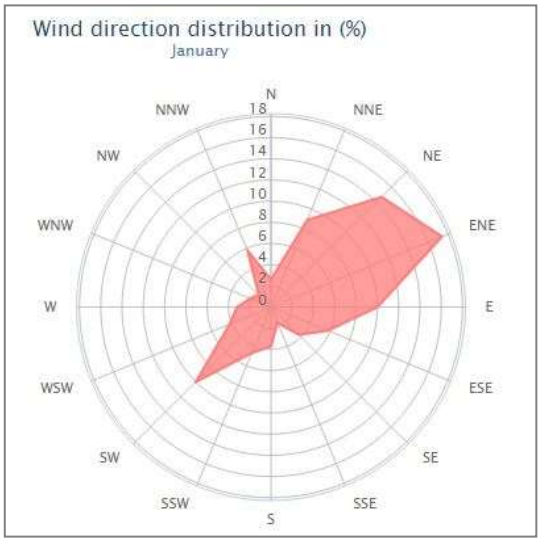
The weather station A2E014 near the site recorded the evaporation at the site as shown in the table below.

Table 11: Evaporation from an A-class pan.

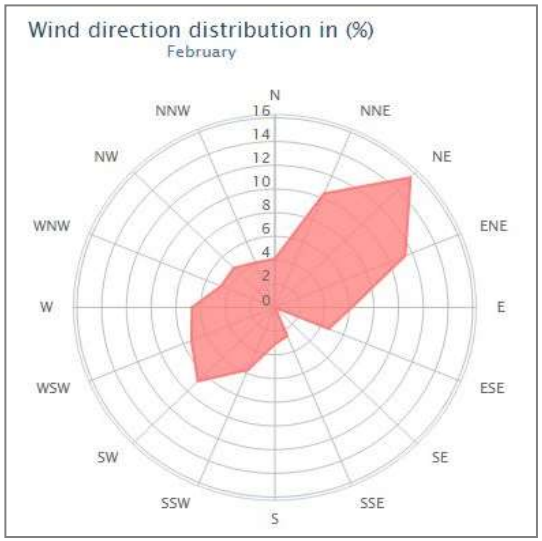
Month	Evaporation
January	229.3
February	187.0
March	183.4
April	142.1
May	127.3
June	105.7
July	123.7
August	169.4
September	202.8
October	251.8
November	233.2
December	231.8
Average	**2187.8**

4.2.4 Wind

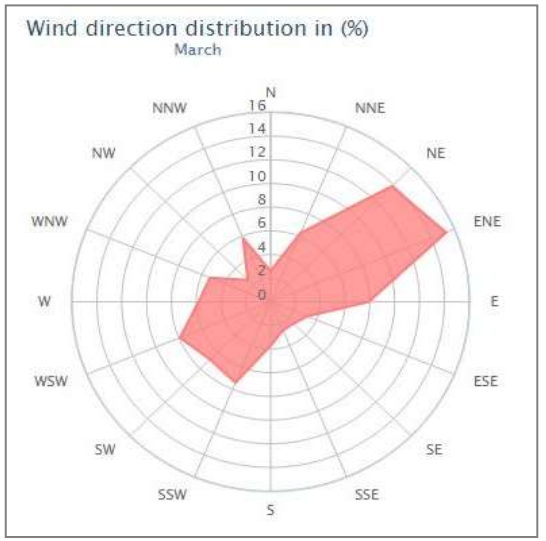
The figures below give an indication of the wind direction distributions near Bela-Bela, as compiled form www.windfinder.com, for the period of December 2011 to November 2015. The most prevalent wind direction is North-East to East-North-East.


Wind direction distribution in (%)
January
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12
14
16
18

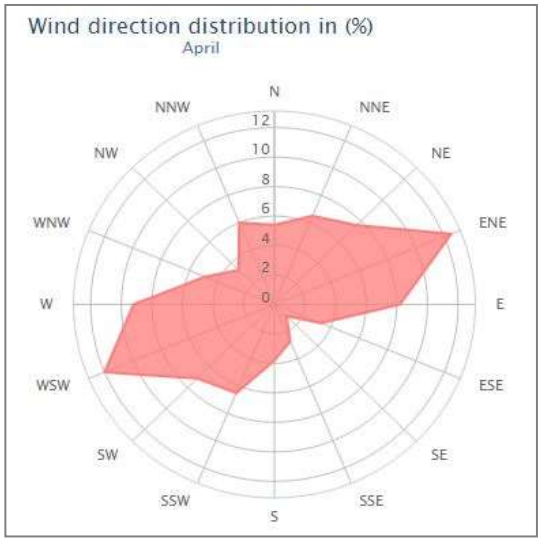
a


Wind direction distribution in (%)
February
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12
14
16

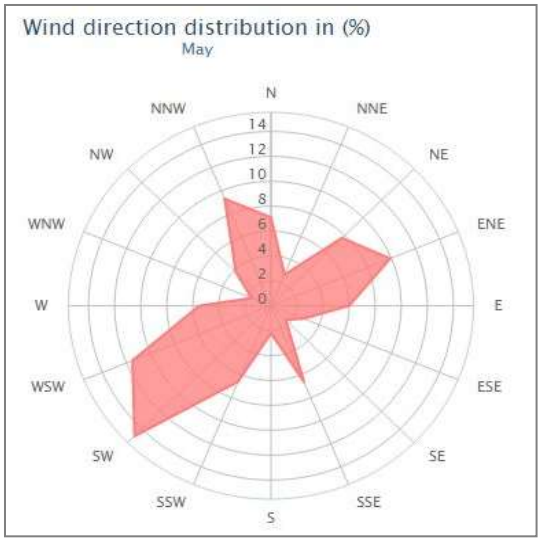
b


Wind direction distribution in (%)
March
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12
14
16

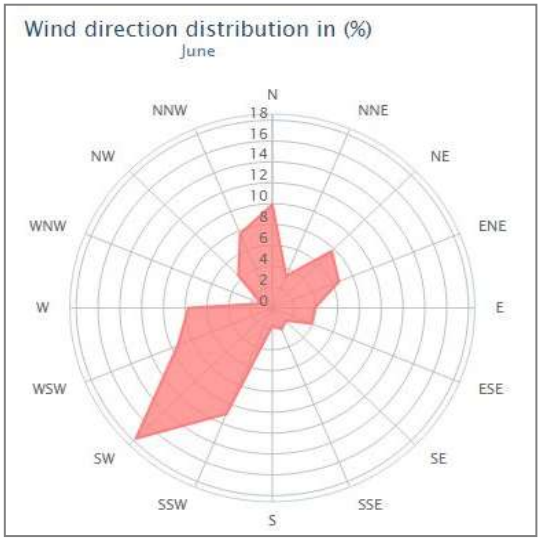
c


Wind direction distribution in (%)
April
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12

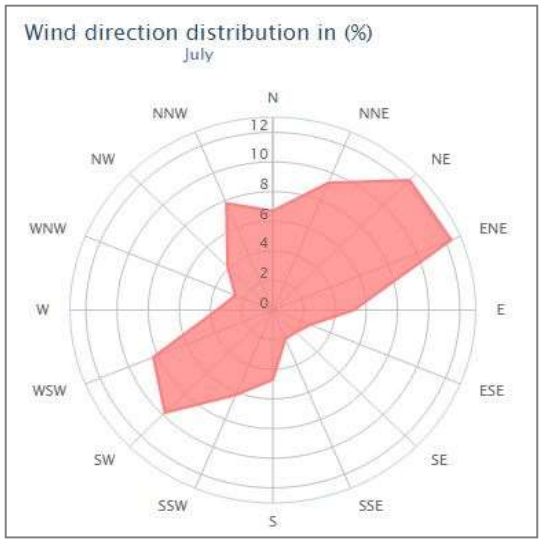
d


Wind direction distribution in (%)
May
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12
14

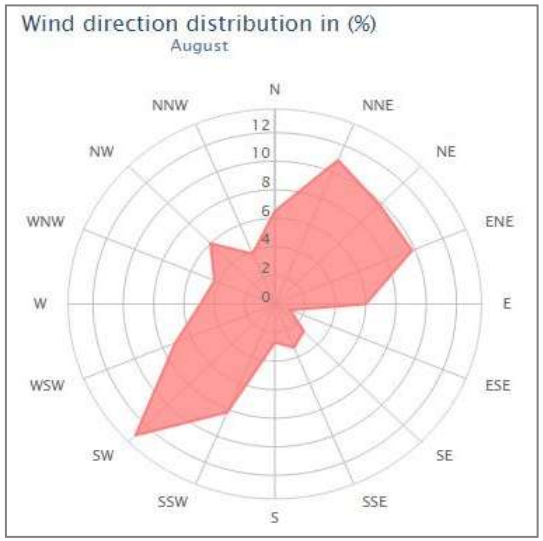
e


Wind direction distribution in (%)
June
N
NNE
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
W
WNW
NW
NNW
0
2
4
6
8
10
12
14
16
18

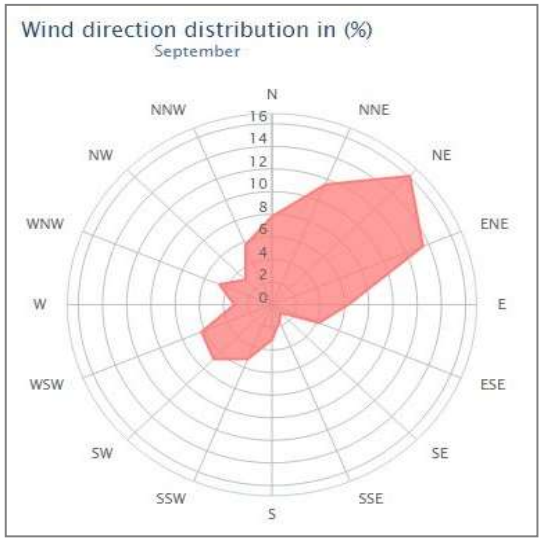
f



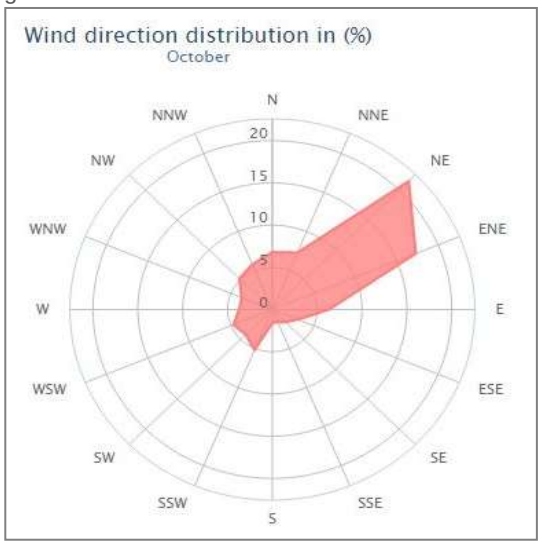
g



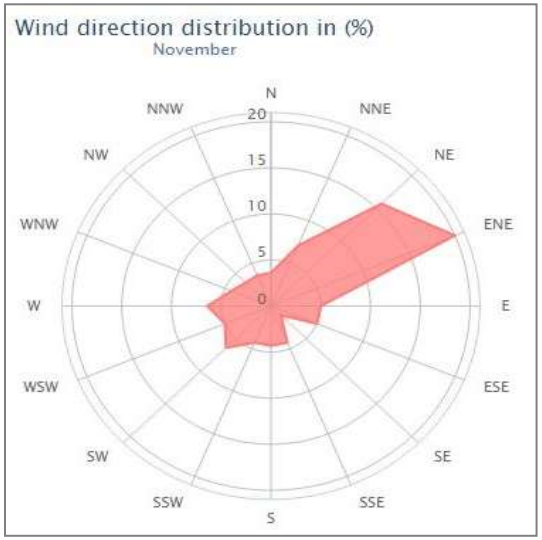
h



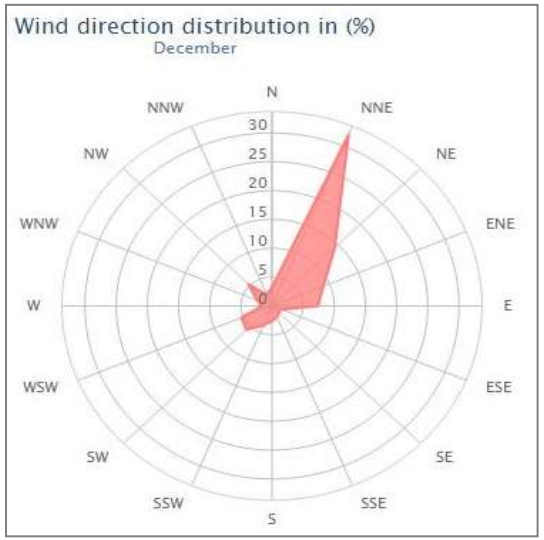
i



j



k



l

Figure 9(a-l): Wind roses showing the monthly wind direction close to the site

4.3 Topography

The figure below shows that the elevation of the site ranges between 1185 and 1210 masl (metres above sea level). The site is located on a relatively flat area with slight elevation from the northern to the southern border. The northern border of the site is located at 1185-1190 masl were it steadily elevates to 1205-1210 masl at the southern border.

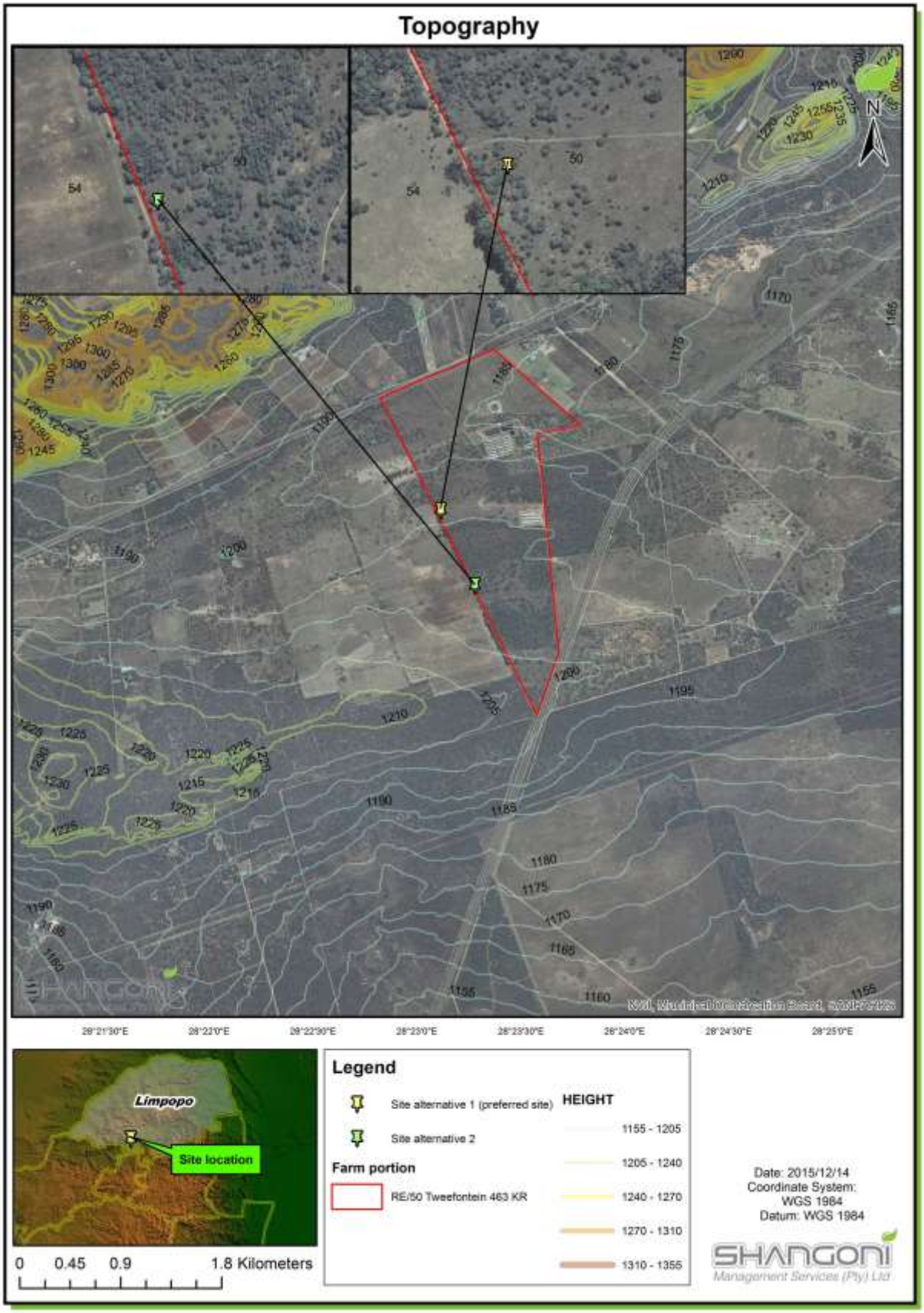


Figure 10: Topography of the site and surrounding area

4.4 Land use and land capability

According to AGIS (2007), the site is located within an area that has moderate potential arable land.

4.5 Vegetation

A vegetation impact assessment was conducted by Dimela Eco Consulting during November 2015 (Appendix D). The assessment consisted of a literature review as well as a field survey (conducted 11 November 2015) to assess the presence and state of vegetation on the site.

The vegetation assessment consisted of a survey of 6ha around the alternative sites identified for the development. The assessment identified, discussed and compared the vegetation expected to occur at these sites. The sensitivity of these vegetation types were also determined and any plants of conservation concern were identified and mapped. The impact the proposed development could have on the vegetation present on the site was assessed and recommendations were made in order to mitigate the identified impacts.

The site for the proposed development is located within the Savanna Biome of South African within the Central Bushveld bioregion. This biome is characterised by a grassy ground layer and a distinct upper layer of woody plants.

4.5.1 Vegetation type(s)

The site is located within the Central Sandy Bushveld vegetation type that occurs in low areas, on sandy plains and between mountains.

Rain events prior to the field survey was limited and therefore vegetation present on the site was dry and had limited leaves or fruits. This hampered positive identification of some species as well as the determination of the species composition. The vegetation observed on site can be categorised into three broad vegetation groups based on species present, dominant species and level of disturbance. Vegetation was characterised as follows:

a. *Terminalia sericea – Hyparrhenia tamba* Secondary bushveld;
b. *Burkea africana – Tristachya rehmanni* Sandy bushveld; and
c. Transformed areas.

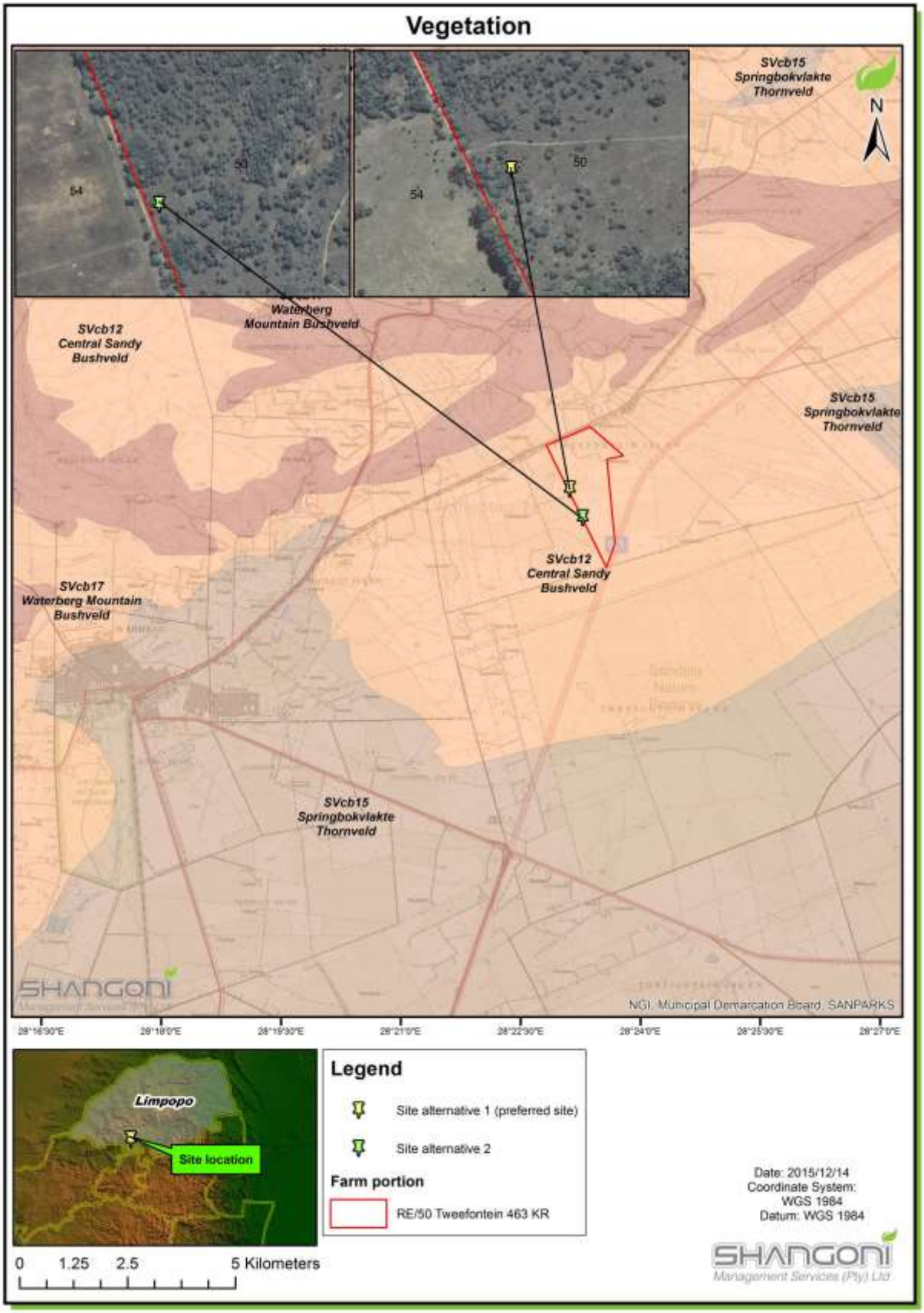


Figure 11: Vegetation Type present on the site

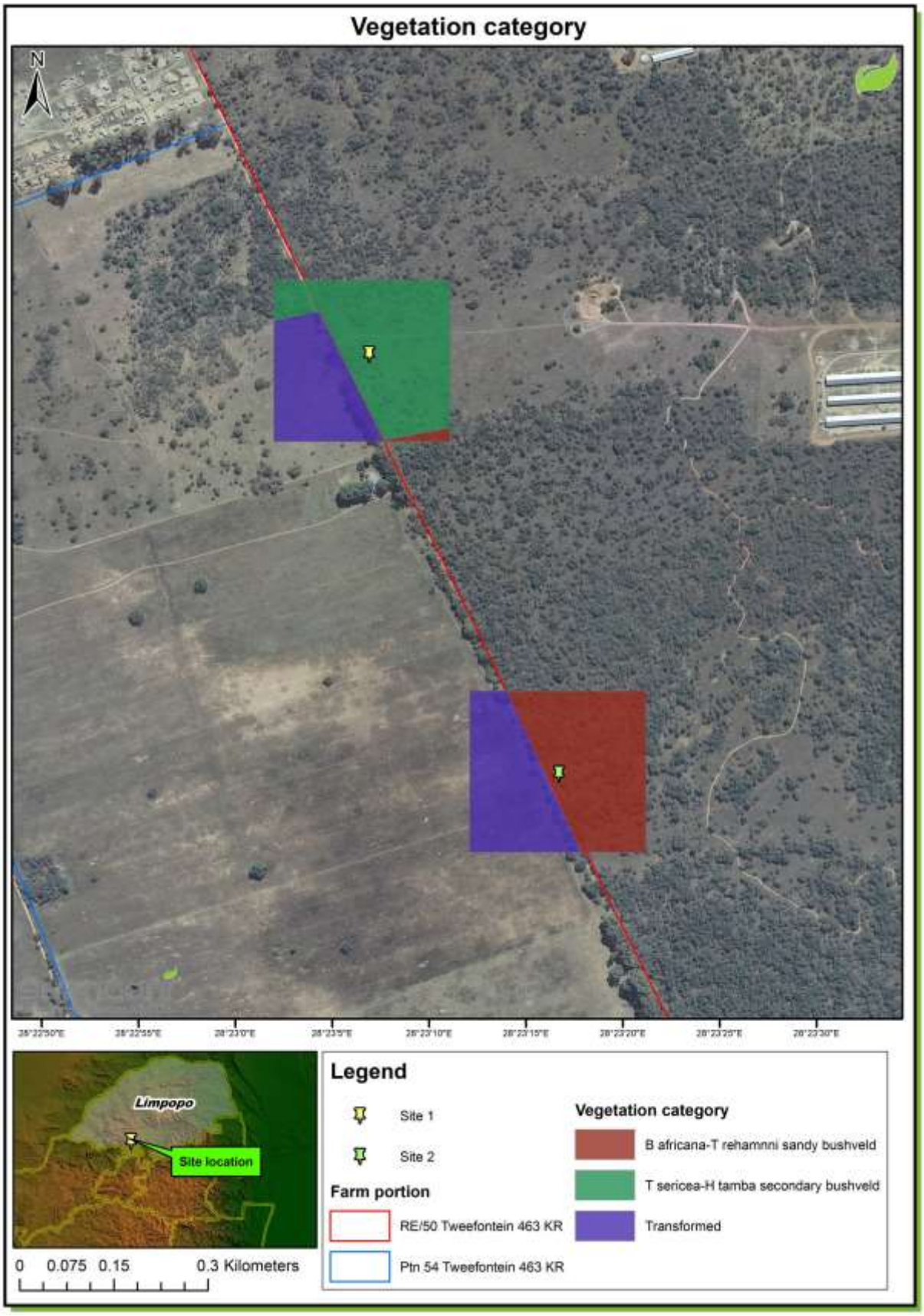


Figure 12: Vegetation identified on the site

4.5.2 Dominant species

4.5.2.1 *Terminalia sericea* – *Hyparrhenia tamba* Secondary Bushveld

Vegetation composition in both the tree and herb/grass layer showed signs of disturbance linked to historical agricultural activities. However, the vegetation in these disturbed areas have recovered to such a degree that it is, in many instances, hard to distinguish between the secondary bushveld and the surrounding vegetation. The area is dominated by pioneer trees such as *Vachellia* (acacia) *karroo*.

4.5.3 Endangered or rare species

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) provides a list of threatened or protected ecosystems, divided into four categories:

- Critically endangered (CR);
- Endangered (EN);
- Vulnerable (VU); or
- Protected.

The ecosystem status is based on the percentage of original area remaining untransformed in relation to the biodiversity target and a threshold for ecosystem functioning. The Central Sandy Bushveld is not a listed ecosystem.

The sensitivity of vegetation present on the site is shown in the figure below.

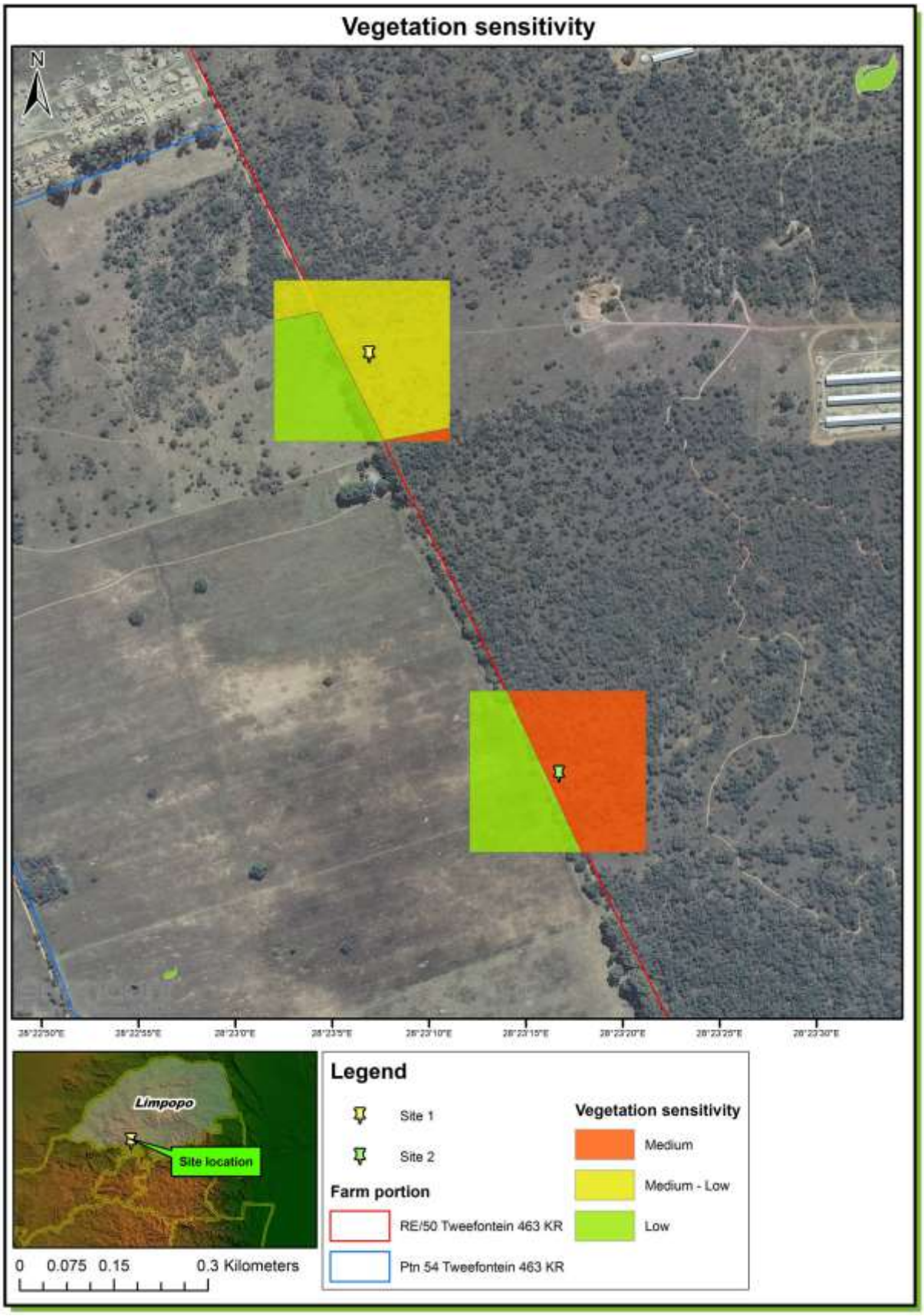


Figure 13: Sensitivity of vegetation present on the site

4.5.4 Alien invasive species

In terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), alien invasive plants can be divided into three categories:

Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can quality to be placed under a government sponsored invasive species management programme. No permits will be issued.

Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.

Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

No major alien plant infestations were present on site. The alien species identified on site occurred sporadically. Ten alien species were identified of which six species are listed as Category 1b invaders. The identified species are listed in the table below:

Table 12: Alien Invasive Plant Species identified on site

Species	Common Name	Notes
Schkuhria pinnata	Dwarf marigold	Weedy annual herb from South America
Eucalyptus species	Bluegums	Category 1b
Lantana camara	Lantana	Declared Category 1b invasive (NEMBA)
Opuntia ficus-indica	Sweet Prickly Pear	Category 1b
Datura stramonium	Thorn-apple/ Olieboom	Category 1b
Gomphrena celosioides	Prostrate Globe Amaranth	Cosmopolitan Weed
Jacaranda mimosifolia	Jacaranda	Category 1b in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North-West
Richardia brasilliensis	-	A weed from South America, naturalised in disturbed areas
Zinnia peruviana	Wildejakobregop	Naturalised weed
Cereus jamacaru	Queen of the night	Category 1b

According to regulations, a person who has under his or her control a Category 1b listed invasive species must immediately:

- Notify the competent authority in writing; and
- Take steps to manage the listed invasive species in compliance with:
  - Section 75 of the Act;
  - The relevant invasive species management programme developed in terms of regulation 4; and
  - Any directive issued in terms of section 73(3) of the Act.

4.5.5 Critical biodiversity area

The figure below indicates the Critical Biodiversity Areas of the project property and surrounding areas. The site is located within and Ecological Support Area 1.

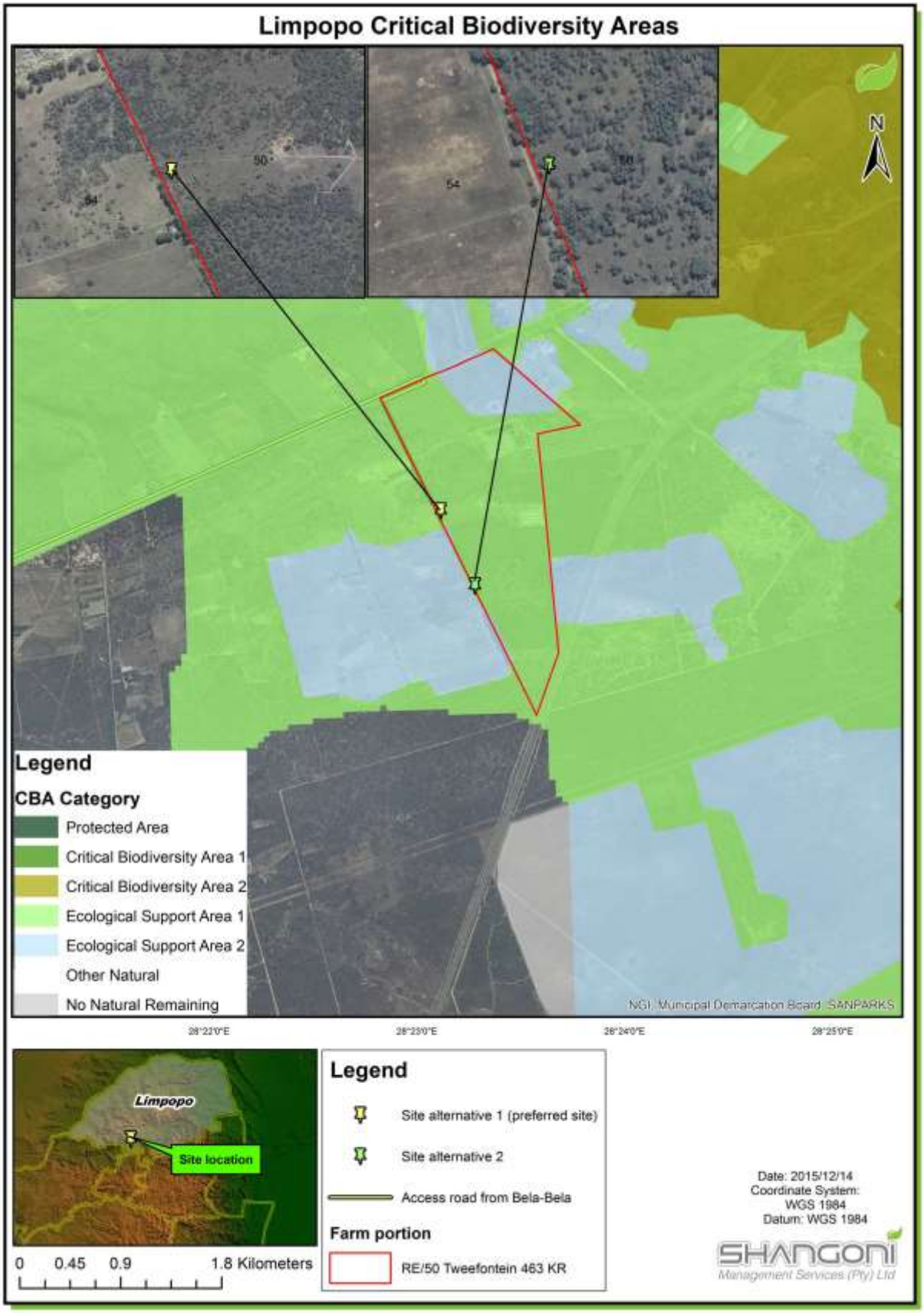


Figure 14: Critical Biodiversity Areas of the site and surrounding areas

4.6 Animal life

A faunal assessment was conducted by Rautenbach *et al.* during October 2015 (Appendix D). The assessment involved the following objectives:

- To define and describe vertebrate habitat types identified on the site;
- To qualitatively and quantitatively assess the significance of vertebrate habitat components and their current general conservation status;
- To identify and comment on ecologically sensitive areas;
- To comment on connectivity;
- To provide a list of mammals, birds, reptiles and frogs that occur or might occur on site, and to identify species of conservation importance (Red Data species);
- To highlight potential impacts of the proposed development on the vertebrate species richness of the study site, and
- To provide management recommendations that mitigate negative and enhance positive impacts, should the proposed development be approved.

Three criteria were used to determine the probability of occurrences of vertebrate species in the area of the site. These include:

- Known distribution ranges;
- Habitat preferences; and
- The qualitative and quantitative presence and extent of suitable habitats on site.

The different levels of probability of occurrence are described in the table below.

Table 13: Level of Probability of Occurrence

Level of Probability	Description
High	Applicable to species with a distributional range overlying the site as well as the presence of prime habitat at the site. Species deemed to have a high probability of occurrence are usually found at high population densities.
Medium	Applicable to species with its distributional range peripherally overlapping the study site, or required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation is also taken into consideration. Species categorized as having a medium probability of occurrence normally do not occur in high population numbers, but cannot not be deemed as rare.
Low	Applicable to species with distributional range that is peripheral to the site and habitat is sub-optimal. Some mammals categorized to have a low probability of occurrence are generally deemed to be rare.

The Faunal Impact Assessment consisted of a desktop survey as well as a field survey. The field survey was conducted on the 25th of November 2015. During the field survey mammals, bird and reptiles were identified by visual sightings while performing random-transect walks or patrolling with a vehicle. The spoor, droppings, burrows, nests, food remains and feathers were used to identify the presence of mammals and birds. Herpetofauna and birds were also identified by their calls.

Due to the fact that animal species may be secretive, nocturnal and/or seasonally active or present, a desktop survey was also conducted. Distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of species based on authoritative literature, scientific literature, field guides, atlases and data bases. This can be done with a high level of confidence regardless of season.

4.6.1 Habitat Assessment

The conservation condition of site is excellent except for a piece of fallow field present. Two alternatives are considered for the construction of the new piggery. Both areas were historically deforested. The greater portion of the farm is in an unaltered or pristine state.

4.6.1.1 Mammals

In terms of habitat availability to mammals, two of the four major habitat types were observed on site namely terrestrial and arboreal habitats. The terrestrial habitat present on site consisted of deep, loose sandy substrate. Arboreal habitat consisted of the high canopies of the woodland trees. The wetland present on site is poorly developed, seasonal and is considered inadequate to support mammalian species. No rupicolous habitat is present on site. Moribund termitaria were recorded on site. These structure are often associated with small creatures such as dwarf shrews and pygmy mice.

4.6.1.2 Avifauna

The main habitat type available to birds on site occurs within the moist woodlands. Due to the aerial mobility of birds it is also important to consider the habitats surrounding the site, even if it is located a distance from the site itself. Distant habitats might provide sources for species visiting the site and sinks for those breeding on site. In this regard, the various national and private nature reserves in the area around the site form important regional conservation areas.

Two principal avifaunal habitat types were identified on site and are considered to be most relevant to bird ecology and community structure:

Mature Bushveld:

The Mature Bushveld habitat type covers the majority of the site and is of notably high quality. The quality in terms of avian habitat is further enhanced by the use of the site as a fenced and protected

game reserve. The presence of a diversity of bird species is guaranteed by the complex structure of the habitat and the provision of food, roosting and nesting resources. The habitat on site favours the presence of birds preferring broad-leaved woodland, while adjacent habitats provide for birds that prefer small-leaved woodlands.

Degraded and/or Transformed Bushveld:
This habitat type is present on the site in all areas that have been cleared for grazing, buildings and/or other agricultural activities. These open areas are expected to attract and support a different variety of species to the mature bushveld, but will provide aspects of the requirements of some open-habitat species.

4.6.1.3 Herpetofauna

Three of the four major herpetofaunal habitat types were identified on site, namely terrestrial, arboreal and wetland-associated vegetation cover. Moribund termitaria were recorded on the study site, which is a good indicator of the occurrence of small herpetofauna.

Indigenous trees with high and dense canopies occur on the study site that may provide suitable habitat to arboreal habitat specific species. Habitat is available for temporary water-breeding frog species in the form of seasonal wetland vegetation. Natural rupicolous habitat was not present on site. The connectivity of the site varies from poor to fair due to the proximity of the Eersbewoond tar road, the Pretoria-Polokwane railway line and the N1 highway.

4.6.2 Observed and Expected Species

4.6.2.1 Mammals

It was concluded that 45 species of mammals occur on site. The occurrence of 25 was confirmed to occur on site during an interview with the owner and by means of visual sightings. These species are indicated in the table below:

Table 14: Mammal species likely to occur on site

Probability of Occurrence	Red Data Ranking	Scientific Name	English Name
Order Afrosoricida			
Family Chrysochloridae			
Medium	CR	*Neamblysomus julianae*	Juliana's golden mole
Order Macroscelididae			
Family Macroscelididae			
Medium	DD	*Elephantulus brachyrhynchus*	Short-snouted elephant shrew
Order Tubulidentata			
Family Orycteropodidae			

High	-	*Orycteropus afer*	Aardvark
Order Lagomorpha			
Family Leporidae			
High	-	*Lepus saxatilis*	Scrub hare
Order Rodentia			
Family Bathyergidae			
High	-	*Cryptomys hottentotus*	African mole rat
Family Hystricidae			
High	-	*Hystrix africaeaustralis*	Cape porcupine
Family Pedetidae			
High	-	*Pedetes capensis*	Springhare
Family Sciuridae			
High	-	*Paraxerus cepapi*	Tree squirrel
Family Myoxidae			
High	-	*Graphiurus murinus*	Woodland dormouse
Family Muridae			
Medium	-	*Rhabdomys pumilio*	Four-striped grass mouse
Medium	-	*Mus minutoides*	Pygmy mouse
Medium	-	*Mastomys natalensis*	Natal multimammate mouse
Low	-	*Thallomys paedulcus*	Acacia rat
High	-	*Aethomys ineptus*	Tete veld rat
	DD	*Gerbilliscus leucogaster*	Bushveld gerbil
Medium	-	*Saccostomus campestris*	Pouched mouse
Medium	-	*Dendromus melanotis*	Grey pygmy climbing mouse
Medium	-	*Dendromus mesomelas*	Brants' climbing mouse
Medium	-	*Dendromus mystacalis*	Chestnut climbing mouse
Order Primates			
Family Galagidae			
Medium	-	*Galago moholi*	South African galago
Family Cercopithecidae			
High	-	*Cercopithecus pygerythrus*	Velvet monkey
Order Eulipotypha			
Family Soricidae			
Medium	DD	*Crocidura cyanea*	Reddish-grey musk shrew
Medium	DD	Crocidura hirta	Lesser red musk shrew
Family Erinaceidae			
Medium	NT	*Atelerix frontalis*	Southern African hedgehog
Order Chiroptera			
Family Embalonuridae			
Low	-	*Taphozous mauritianus*	Mauritian tomb bat
Family Molossidae			
Low	-	*Tadarida aegyptiaca*	Egyptian free-tailed bat
Family Vespertilionidae			

High	-	*Neoromicia capensis*	Cape serotine bat
High	-	*Scotophilus dinganii*	African yellow house bat
High	-	*Scotophilus viridis*	Greenish yellow house bat
Order Carnivora			
Family Hyaenidae			
Low	-	*Proteles cristatus*	Aardwolf
Medium	NT	*Parahyaena brunnea*	Brown hyena
Family Felidae			
High	-	*Panthera pardus*	Leopard
High	-	*Caracal*	Caracal
High	-	*Felis silvestris*	African wild cat
High	-	*Leptailurus serval*	Serval
Family Viverridae			
High	-	*Genetta*	Small-spotted genet
High	-	*Genetta tigrina*	SA large-spotted genet
Family Herpestidae			
High	-	*Cynictis penicillata*	Yellow mongoose
High	-	*Galerella sanguinea*	Slender mongoose
High	-	*Mungos mungo*	Banded mongoose
Family Canidae			
High	-	*Canis mesomelas*	Black-backed jackal
Family Mustelidae			
High	NT	*Mellivora capensis*	Honey badger
Low	DD	*Poecilogale albinucha*	African weasel
High	-	*Ictonyx striatus*	Striped polecat
Order Perissodactyla			
Family Equidae			
High	-	*Equus quagga*	Plains zebra
Order Suiformes			
Family Suidae			
High	-	*Potamochoerus larvatus*	Bushpig
High	-	*Phacochoerus africanus*	Common warthog
Order Ruminanta			
Family Bovidae			
	-	*Tragelaphus strepsiceros*	Kudu
High	-	*Tragelaphus angasii*	Nyala
High	-	*Connochaetes taurinus*	Blue wildebeest
High	-	*Sylvicapra grimmia*	Common duiker
High	-	*Raphicerus campestris*	Steenbok
High	-	*Aepyceros melampus*	Impala

Red data species rankings as defined in Friedmann and Daly's SA Red Data Book (IUCN (World Conservation Union, 2004) are defined as follows:

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LR/cd = Lower risk conservation development, LR/nt = Lower risk near threatened and DD = Data Deficient. All other species are considered to be of Least Concern (LC).

The following species were confirmed to occur on the site:

Table 15: Mammal species confirmed to occur on site

Scientific Name	English Name	Observation Indicator	Habitat
O. afer	Aardvark	Burrows	Soft soil
L. saxatilis	Scrub hare	Faecal pellets	Universal/Grassland
C. hottentotus	African mole rat	Tunnel system	Universal
H. africaeaustralis	Cape porcupine	Quills	Universal
P. capensis	Springhare	Reported by owner	Sandy substrate
P. cepapi	Tree squirrel	Sight record	Tree
C. pygerythrus	Vervet monkey	Reported by owner	Woodland
P. brunnea	Brown hyena	Reported by owner	Universal
P. pardus	Leopard	Reported by owner	Universal
C. caracal	Caracal	Reported by owner	Universal
F. silvestris	African wild cat	Reported by owner	Universal
L. serval	Serval	Reported by owner	Universal
C. penicillata	Yellow mongoose	Reported by owner	Good cover
G. sanguinea	Slender mongoose	Reported by owner	Good cover
M. mungo	Banded mongoose	Reported by owner	Woodland
C. mesomelas	Black-backed jackal	Reported by owner	Universal
M. capensis	Honey badger	Reported by owner	Good cover
E. quagga	Plains zebra	Sight record	Grassy plain
P. larvatus	Bushpig	Reported by owner	Moist soil
P. africanus	Common warthog	Reported by owner	Savanna
C. taurinus	Blue wildebeest	Sight record	Grassy plain
T. angasii	Nyala	Sight record	Riparian zones
S. grimmia	Common duiker	Sight record	Universal/Grassveld
R. campestris	Steenbok	Reported by owner	Universal/Grassveld
A. melampus	Impala	Reported by owner	Savanna

The species richness on site is high, especially considering that two of the major habitat types are absent on site.

4.6.2.2 Avifauna

A total of 247 bird species is expected to occur on and around the site in its present form. Of the expected species 138 have a high probability of occurrence, 47 have a medium probability of occurrence and 62 have a low probability. These numbers indicate the somewhat limited potential of some of the habitats (transformed areas). 32 bird species were recorded during the site assessment

and two were reported to occur by the landowner. The bird species expected to occur on site are given in the table below.

Table 16: Bird species expected on and around the site

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Crested Francolin	*Dendroperdix sephanea*				High	X	
	Shelley's Francolin	*Scleroptila shelleyi*				Low	X	
	Swainson's Spurfowl	*Pternistis swainsonii*				High		X
	Common Quail	*Coturnix*		NBM		High		X
X	**Helmeted Guineafowl**	***Numida meleagris***				**High**		**X**
	White-faced Duck	*Dendrocygna viduata*				Low		X
	Egyptian Goose	*Alopochen aegyptiaca*				Low		X
	Spur-winged Goose	*Plectropterus gambensis*				Low		X
	Yellow-billed Duck	*Anas undulata*				Low		X
	Red-billed Teal	*Anas erythrorhyncha*				Low		X
	Kurrichane Buttonquail	*Turnix sylvaticus*				High		X
	Greater Honeyguide	*Indicator indicator*				High	X	
	Lesser Honeyguide	*Indicator minor*				High	X	
	Brown-backed Honeybird	*Prodotiscus regulus*				High	X	
	Bennett's Woodpecker	*Campethera bennettii*				High	X	
	Golden-tailed Woodpecker	*Campethera abingoni*				High	X	
	Cardinal Woodpecker	*Dendropicos fuscescens*				High	X	
	Bearded Woodpecker	*Dendropicos namaquus*				High	X	
X	**Yellow-fronted Tinkerbird**	***Pongoniulus chrysoconus***				**High**	**X**	
	Acacia Pied Barbet	*Thricholaema leucomelas*				Medium		X
X	**Black-collared Barbet**	***Lybius torquatus***				**High**	**X**	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
X	**Crested Barbet**	***Trachyphonus vaillantii***				**High**	**X**	
	Red-billed Hornbill	*Tockus rufirostris*				Low		X
	Southern Yellow-billed Hornbill	*Tockus leucomelas*				High	X	
X	**African Grey Hornbill**	***Tockus nasutus***				**Medium**	**X**	
	African Hoopoe	*Upupa africana*				High	X	X
	Green Wood-hoopoe	*Phoeniculus purpureus*				High	X	
	Common Scimitarbill	*Rhinopomastus cyanomelas*				Low		X
	European Roller	*Coracias garrulus*	NT	NBM		Low		X
X	**Lilac-breasted Roller**	***Coracias caudatus***				**High**		**X**
	African Pygmy-Kingfisher	*Ispidina picta*		BM		High	X	
X	**Woodland Kingfisher**	***Halcyon senegalensis***		**BM**		**High**	**X**	
X	**Brown-hooded Kingfisher**	***Halcyon albiventris***				**High**	**X**	
	Striped Kingfisher	*Halcyon chelicuti*				High	X	
	Little Bee-eater	*Merops pusillus*				High	X	
	European Bee-eater	*Merops apiaster*		B/NBM		High	X	X
	Speckled Mousebird	*Colius striatus*				High	X	
	Red-faced Mousebird	*Urocolius indicus*				High	X	X
X	**Jacobin Cuckoo**	***Clamator jacobinus***		**BM**		**High**	**X**	**X**
X	**Levaillant's Cuckoo**	***Clamator levaillantii***		**BM**		**High**	**X**	
	Great Spottech Cuckoo	*Clamator glandarius*		BM		Medium	X	
X	**Red-chested Cuckoo**	***Cuculus solitarius***		**BM**		**High**	**X**	
	Black Cuckoo	*Cuculus clamosus*		BM		Medium		X
	Common Cuckoo	*Cuculus canorus*		NBM		Medium	X	
X	**African Cuckoo**	***Cuculus gularis***		**BM**		**Low**	**X**	
	Klaas's Cuckoo	*Chrysococcyx klaas*				Medium	X	
	Diderick Cuckoo	*Chrysococcyx caprius*		BM		High	X	X
	Burchell's Coucal	*Centropus burchellii*				Low		X

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Meyer's Parrot	*Poicephalus meyeri*				Medium	X	
X	**African Palm-Swift**	***Cypsiurus parvus***				**High**	**Aerial**	
	Alpine Swift	*Tachymarptis melba*		BM		Medium	Aerial	
	Common Swift	*Apus*		NBM		Low	Aerial	
	African Black Swift	*Apus barbatus*				High	Aerial	
	Little Swift	*Apus affinis*				High		X
							Aerial	
	White-rumped Swift	*Apus caffer*		BM		High		X
							Aerial	
X	**Grey Go-away-bird**	***Corythaixoides concolor***				**High**	**X**	**X**
X	**Barn Owl (Reported by Kobus Humphries)**	***Tyto alba***				**High**	**X**	**X**
	African Grass-Owl	*Tyto capensis*	VU/LC			Low		X
	African Scops-Owl	*Otus senegalensis*				High	X	
	Southern White-faced Scops-Owl	*Ptilopsis granti*				Medium	X	
	Spotted Eagle-Owl	*Bubo africanus*				High	X	X
	Verreaux's Eagle-Owl	*Bubo lacteus*				Low	X	
	Pearl-spotted Owlet	*Glaucidium perlatum*				High	X	X
	Marsh Owl	*Asio capensis*				Low		X
	Fiery-necked Nightjar	*Caprimulgus pectoralis*				High	X	
	Rufous-cheeked Nightjar	*Caprimulgus rufigena*		BM		High	X	
	European Nightjar	*Caprimulgus europaeus*				High	X	
	Rock Dove	*Columba livia*				High		X
	Speckled Pigeon	*Columba guinea*				Medium		X
	African Olive-Pigeon	*Columba arquatrix*				Low	X	
X	**Laughing Dove**	***Streptopelia senegalensis***				**High**	**X**	**X**
	Cape Turtle-Dove	*Streptopelia capicola*				High	X	X
X	**Red-eyed Dove**	***Streptopelia semitorquata***				**High**	**X**	
	Emerald-spotted	*Turtur chalcospilos*				High	X	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Wood-Dove							
	African Green-Pigeon	*Treron calvus*				High	X	
	Red-crested Korhaan	*Lophotis ruficrista*				Low	X	
	Red-chested Flufftail	*Sarothrura rufa*				Low		X
	African Rail	*Rallus caerulescens*				Medium		X
	African Crake	*Crecopsis egregia*		BM		Low		X
	Black Crake	*Amourornis flavirostra*				High		
	Baillon's Crake	*Porzana pusilla*				High		X
	African Snipe	*Gallinago nigripennis*				Low		X
	Wood Sandpiper	*Tringa glareola*		NBM		Low		X
	Common Sandpiper	*Actitis hypoleucos*		NBM		Low		X
	Little Stint	*Calidris minuta*		NB		Low		X
	Ruff	*Philomachus pugnax*		NBM		Low		X
	Spotted Thick-knee	*Burhinus capensis*				High	X	X
	Three-banded Plover	*Charadrius tricollaris*				High		X
	Blacksmith Lapwing	*Vanellus armatus*				High		X
	African Wattled Lapwing	*Vanellus senegallus*				Medium		X
	Crowned Lapwing	*Vanellus coronatus*				High		X
	Bronze-winged Courser	*Rhinoptilus chalcopterus*				Medium	X	
	Black-winged Pratincole	*Glareola nordmanni*	NT	NBM		Medium	Aerial	
	African Cuckoo Hawk	*Aviceda cuculoides*				Low	X	
	Black-shouldered Kite	*Elanus caeruleus*				High	X	X
	Yellow-billed Kite	*Milvus aegyptius*		BM		Medium	X	X
	White-backed Vulture	*Gyps africanus*	EN			Low	X	
	Cape Vulture	*Gyps coprotheres*	EN			Low	X	
	Lappet-faced Vulture	*Aegypius tracheliotos*	EN			Low	X	
	Black-chested Snake-Eagle	*Circaetus pectoralis*				Medium	X	X
	Brown Snake-Eagle	*Circaetus cinereus*				High	X	
	African Harrier-Hawk	*Polyboroides typus*				High	X	
	Lizard Buzzard	*Kaupifalco monogrammicus*				High	X	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Shikra	*Accipiter badius*				High	X	X
	Little Sparrowhawk	*Accipiter minullus*				Medium	X	
	Ovambo Sparrowhawk	*Accipiter ovampensis*				Low		X
	Steppe Buzzard	*Buteo buteo*		NBM		High	X	X
	Jackal Buzzard	*Buteo rufofuscus*			(*)	Low		X
	Tawny Eagle	*Aquila rapax*	EN			Low	X	X
	Verreaux's Eagle	*Aquila verreauxii*	VU			Low		X
	African Hawk-Eagle	*Aquila spilogaster*				Medium	X	X
X	**Wahlberg's Eagle**	***Hieraaetus wahlbergi***		**BM**		**High**	**X**	**X**
	Martial Eagle	*Polemaetus bellicosus*	EN			Low	X	X
X	**Secretarybird (Reported by Kobus Humphries)**	***Sagittarius serpentarius***	**VU**			**Low**		**X**
	Lesser Krestel	*Falco naumanni*		NBM		Low		X
	Rock Krestel	*Falco rupicolus*				Low		X
	Amur Falcon	*Falco amurensis*		NBM		Low		X
	Lanner Falcon	*Falco biarmicus*	VU			Low	X	X
	Little Egret	*Egretta garzetta*				Low		X
	Yellow-billed Egret	*Egretta intermedia*				Low		X
	Grey heron	*Ardea cinerea*				Low		X
	Black-headed Heron	*Ardea melanocephala*				High		X
	Cattle Egret	*Bubulcus ibis*				High		X
	Squacco Heron	*Ardeola ralloides*				Low		X
	Glossy Ibis	*Plegadis falcinellus*				Low		X
	Hadeda Ibis	*Bostrychia hagedash*				High	X	X
	African Sacred Ibis	*Threskiornis aethiopicus*				Low		X
	African Spoonbill	*Platalea alba*				Low		X
	Abdim's Stork	*Ciconia abdimii*				High		X
	White Stork	*Ciconia*		NBM		High		X
	Eurasian Golden Oriole	*Oriolus*		NBM		Low	X	
	Black-headed Oriole	*Oriolus larvatus*				High	X	
X	**Fork-tailed Drongo**	***Dicrurus adsimilis***				**High**	**X**	**X**
	African Paradise Flycatcher	*Terpsiphone viridis*				High	X	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Brubru	*Nilaus afer*				High	X	X
	Black-backed Puffback	*Dryoscopus cubla*				High	X	
	Black-crowned Tchagra	*Tchagra senegalus*				High	X	
X	**Brown-crowned Tchagra**	***Tchagra australis***				**High**	**X**	
	Southern Boubou	*Laniarius ferrugineus*				High	X	
	Crimson-breasted Shrike	*Laniarius astrococcineus*				Low		X
	Orange-breasted Bush-Shrike	*Chlorophoneus sulfureopectus*				High	X	
	Grey-headed Bush-Shrike	*Malaconotus blanchoti*				High	X	
	White-crested Helmet-Shrike	*Prionops plumatus*				High	X	
X	**Chinspot Batis**	***Batis molitor***				**High**	**X**	
	Pied Crow	*Corvus albus*				Medium	X	X
	Red-backed Shrike	*Lanius collurio*		NBM		High		X
	Lesser Grey Shrike	*Lanius minor*		NBM		Medium		X
	Common Fiscal	*Lanius collaris*				High		X
	Black Cuckooshrike	*Campephaga flava*				High	X	
	Grey Penduline-Tit	*Anthoscopus caroli*				Low		X
X	**Southern Black Tit**	***Parus niger***				**High**	**X**	
	Barn Swallow	*Hirundo rustica*		NBM		High	Aerial	
	Pearl-breasted Swallow	*Hirundo dimidiata*				High	X	
							Aerial	
	Greater Striped Swallow	*Cecropis cucullata*		BM		Medium		X
							Aerial	
	Lesser Striped Swallow	*Cecropis abyssinica*		BM		High		X
							Aerial	
	Red-breasted Swallow	*Cecropis semirufa*				High		X
							Aerial	
	Rock Martin	*Hirundo fuligula*				Medium		X
							Aerial	
	Common House-	*Delichon urbicum*		NBM		Medium	Aerial	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Martin							
	Dark-capped Bulbul	*Pycnonotus tricolor*				High	X	X
	Yellow-bellied Greenbul	*Chlorocichla flaviventris*				Medium	X	
	Long-billed crombec	*Sylvietta rufescens*				High	X	X
	Lesser Swamp-Warbler	*Acrocephalus gracilirostris*				Medium		X
	Icterine Warbler	*Hippolais icterina*		NBM		High	X	
	Willow Warbler	*Phylloscopus trochilus*		NBM		High	X	
X	**Arrow-marked Babbler**	***Turdoides jardineii***				**High**	**X**	
	Chestnut-vented Tit-Babbler	*Sylvia subcaerulea*				Medium		X
	Garden Warbler	*Sylvia borin*		NBM		High	X	
X	**Cape White-eye**	***Zosterops capensis***			**(*)**	**High**	**X**	
X	**Rattling Cisticola**	***Cisticola chiniana***				**High**	**X**	
	Tinkling Cisticola	*Cisticola rufilatus*				Medium	X	
	Levaillant's Cisticola	*Cisticola tinniens*				Medium		X
X	**Neddicky**	***Cisticola fulvicapilla***				**High**	**X**	**X**
X	**Zitting Cisticola**	***Cisticola juncidis***				**High**		**X**
	Desert Cisticola	*Cisticola aridulus*				Medium		X
X	**Tawny-flanked Prinia**	***Prinia subflava***				**High**	**X**	**X**
	Black-chested Prinia	*Prinia flavicans*				Low		X
	Bar-throated Apalis	*Apalis thoracica*				High	X	
	Grey-backed Camaroptera	*Camaroptera brevicaudata*				High	X	
	Barred Wren-Warbler	*Calamonastes fasciolatus*				Medium	X	
	Monotonous Lark	*Mirafra passerina*				Medium		X
X	**Rufous-naped Lark**	***Mirafra africana***				**High**		**X**
	Flappet Lark	*Mirafra rufocinnamomea*				Medium	X	
	Sabota Lark	*Calendulauda sabota*				High	X	
	Fawn-coloured Lark	*Calendulauda africanoides*				Low	X	
	Chestnut-backed	*Eremopterix leucotis*				Low		X

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Sparrowlark							
	Red-capped Lark	*Calandrella cinerea*				Medium		X
	Groundscraper Thrush	*Psophocichla litsitsirupa*				High	X	
	Kurrichane Thrush	*Turdus libonyanus*				High	X	
	Karoo Thrush	*Turdus smithi*			(*)	Medium		X
	Pale Flycatcher	*Bradornis pallidus*				High	X	
	Marico Flycatcher	*Bradornis mariquensis*				High		X
	Southern Black Flycatcher	*Melaenornis pammelaina*				High	X	
	Spotted Flycatcher	*Muscicapa striata*		NBM		High	X	X
	Grey Tit-flycatcher	*Myioparus plumbeus*				High	X	
	Cape Robin-Chat	*Cossypha caffra*				High	X	
	White-throated Robin-Chat	*Cossypha humeralis*				Medium	X	
X	**White-browed Scrub-Robin**	***Erythropygia leucophrys***				**High**	**X**	**X**
	African Stone-Chat	*Saxicola torquatus*				High		X
	Capped Wheatear	*Oenanthe pileata*				Medium		X
	Familiar Chat	*Cercomela familiaris*				High	X	X
	Red-winged Starling	*Onychognathus morio*				Medium	X	
	Cape Glossy Starling	*Lamprotornis nitens*				High	X	X
	Burchell's Starling	*Lamprotornis australis*				Low	X	
	Violet-backed Starling	*Cinnyricinclus leucogaster*				High	X	
	Wattled Starling	*Creatophora cinerea*				High		X
	Common Myna	*Acridotheres tristis*		I		High		X
	Red-billed Oxpecker	*Buphagus erythrorhynchus*				Medium	X	
X	**Amethyst Sunbird**	***Chalcomitra amethystina***				**High**	**X**	
X	**White-bellied Sunbird**	***Cinnyris talatala***				**High**	**X**	
	Marico Sunbird	*Cinnyris mariquensis*				High	X	X
	White-browed Sparrow-Weaver	*Plocepasser mahali*				Medium		X
	Lesser Masked-	*Ploceus intermedius*				Low		X

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Weaver							
	Spectacled Weaver	*Ploceus ocularis*				Medium	X	
	Southern Masked-Weaver	*Ploceus velatus*				High	X	X
	Village Weaver	*Ploceus cucullatus*				Low		X
	Red-headed Weaver	*Anaplectes rubriceps*				High	X	
	Red-billed Quelea	*Quelea quelea*				High		X
	Yellow-crowned Bishop	*Euplectes afer*				Low		X
	Southern Red Bishop	*Euplectes orix*				Low		X
	White-winged Widowbird	*Euplectes albonotatus*				Medium		X
	Cut-throat Finch	*Amadina fasciata*				High	X	
	Common Waxbill	*Estrilda astrild*				Low		X
	Blue Waxbill	*Uraeginthus angolensis*				Low		X
	Green-winged Pytilia	*Pytilia melba*				Medium	X	X
	Red-billed Firefinch	*Lagonosticta senegala*				Low		X
	African Firefinch	*Lagonosticta rubricata*				Low	X	
	Jameson's Firefinch	*Lagonosticta rhodopareia*				High	X	X
	Bronze Mannikin	*Spermestes cucullata*				Medium	X	X
	Pin-tailed Whydah	*Vidua macroura*				High	X	X
	Village Indigobird	*Vidua chalybeata*				Low		X
	Dusky Indigobird	*Vidua funerea*				Low	X	
	Purple Indigobird	*Vidua purpurascens*				High		X
	House Sparrow	*Passer domesticus*				High		X
	Southern Grey-headed Sparrow	*Passer diffusus*				High	X	
	Yellow-throated Petronia	*Gymnoris superciliaris*				High	X	
	African Pied Wagtail	*Motacilla aguimp*				Low		X
	Cape Wagtail	*Motacilla capensis*				High		X
	African Pipit	*Anthus cinnamomeus*				High		X
	Plain-backed Pipit	*Anthus leucophrys*				Medium		X
	Buffy Pipit	*Anthus vaalensis*				Low		X
	Bushveld Pipit	*Anthus caffer*				High	X	

Recorded	English Name	Scientific Name	Status Codes			Probability of Occurrence	Preferred Habitats	
			Red Status	Status in SA	Endemism in SA		Mature Bushveld	Transformed Bushveld
	Yellow-fronted Canary	*Crithagra mozambica*				High	X	X
	Black-throated Canary	*Crithagra atrogularis*				High		X
	Streaky-headed Seedeater	*Crithagra gularis*				High	X	
	Cinnamon-breasted Bunting	*Emberiza tahapisi*				Medium		X
X	**Golden-breasted Bunting**	***Emberiza flaviventris***				**High**	**X**	

Red Status	Status in South Africa	Endemism in South Africa
NA = Not Assessed	BM = Breeding migrant	* = Endemic
LC = Least Concern	NBM = Non-breeding migrant	(*) = Near endemic (i.e.~70% or more of population in RSA)
NT = Near Threatened	V = Vagrant	
VU = Vulnerable	I = Introduced	B* = Breeding endemic
EN = Endangered	R = Rare	B(*) = Breeding near endemic
CR = Critically Endangered	PRB = Probable rare breeder	W* = Winter endemic
EX = Extinct Regionally	RB = Rare breeder	
NR = Not Recognised	RV = Rare visitor	

4.6.2.3 Herpetofauna

A total of 84 herpetofaunal species may occur on the site, of which 66 are reptile species and 18 are amphibians. None of these species were, however, confirmed to occur on site. Mr Kobus Humphries did, however, confirm the presence of the Southern African python on site.

Table 17: Herpetofaunal species expected to occur on site

Probability of Occurrence	Scientific Name	English Name
	CLASS: REPTILIA	**REPTILES**
	Order: TESTUDINES	TORTOISES & TERRAPINS
	Family: Testudinidae	Tortoises
?	*Kinixys lobatsiana*	Lobatse Hinged-Back Tortoise
*	*Kinixys spekii*	Speke's Hinged-Back Tortoise
?	*Psammobates oculifer*	Serrated Tent tortoise
?	*Stigmochelys pardalis*	Leopard Tortoise

Probability of Occurrence	Scientific Name	English Name
	Order: SQUAMATA	SCALE-BEARING REPTILES
	Suborder: LACERTILIA	LIZARDS
	Family: Gekkonidae	Geckos
√	*Chondrodactylus turneri*	Turner's Gecko
*	*Hemidactylus mabouia*	Common Tropical House Gecko
?	*Homopholis wahlbergii*	Wahlberg's Velvet Gecko
√	*Lygodactylus capensis*	Common Dwarf Gecko
√	*Pachydactylus affinis*	Transvaal Gecko
√	*Pachydactylus capensis*	Cape Gecko
	Family: Amphisbaenidae	Amphisbaenians
?	*Monopeltis infuscate*	Dusky Worm Lizard
	Family: Lacertidae	Old World Lizards or Lacertids
√	*Ichnotropis capensis*	Ornate Rough-Scaled Lizard
√	*Meroles squamulosus*	Savanna Lizard
√	*Nucras holoibi*	Holub's Sandveld Lizard
*	*Nucras intertexta*	Spotted Sandveld Lizard
√	*Pedioplanis lineoocellata lineoocellata*	Spotted Sand Lizard
*	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard
	Family: Cordyidae	
?	*Cordylus jonesii*	Jones' Girdled Lizard
	Family: Gerrhosauridae	Plated Lizards
*	*Gerhosaurus flavigularis*	Yellow-throated Plated Lizard
	Family: Scincidae	Skinks
?	*Acontias occidentalis*	Savanna Legless skink
√	*Afroablepharus wahlbergii*	Wahlberg's Snake-Eyed Skink
√	*Mochlus sundevallii sundevallii*	Sundevall's Writhing Skink
√	*Trachylepis capensis*	Cape Skink
√	*Trachylepis punctatissima*	Speckled Rock Skink
*	*Trachylepis varia*	Variable Skink
	Family: Varanidae	Monitors
√	*Varanus albigularis*	Water Monitor
	Family: Chamaeleonidae	Chameleons
	Chamaeleo dilepis dilepis	Common Flap-Neck Chameleon
	Family: Agamidae	Agamas
√	*Agama aculeata distanti*	Eastern Ground Agama
√	*Acanthocercus atricollis atricollis*	Southern Tree Agama
	Suborder: SERPENTES	SNAKES
	Family: Typhlopidae	Blind Snakes
?	*Afrotyphlops bibronii*	Bibron's Blind Snake
?	*Megatyphlops schlegelii*	Schlegel's Giant Blind Snake
?	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake

Probability of Occurrence	Scientific Name	English Name
	Family: Leptotyphlopidae	Thread Snakes
*	*Leptotyphlops distanti*	Distant's Thread Snake
?	*Leptotyphlops incognitus*	Incognito Thread Snake
*	*Leptotyphlops scutifrons scutifrons*	Peter's Thread Snake
	Family: Pythonidae	Pythons
√ Vu	*Python natalensis*	Southern African Python
	Family: Viperidae	Adders
√	*Bits arietans*	Puff Adder
*	*Bits caudalis*	Horned Adder
√	*Causus rhombeatus*	Rhombic Night Adder
	Family: Lamprophiidae	
*	*Amblyodipsas polylepis polylepis*	Common Purple-Glossed Snake
?	*Aparallactus capensis*	Black-Headed Centipede Eater
√	*Atractaspis bibronii*	Bibron's Stiletto Snake
?	*Xenocalamus bicolor australis*	Waterberg-Quill-Snouted Snake
√	*Boaedon capensis*	Common House Snake
*	*Gonionotophis capensis capensis*	Common File Snake
?	*Lycodonomorphus inornatus*	Olive Ground Snake
?	*Lycophidion capense*	Cape Wolf Snake
?	*Psammophis angolensis*	Dwarf Sand Snake
√	*Psammophis brevirostris*	Short-Snouted Grass Snake
?	*Psammophis jallae*	Jalla's Sand Snake
?	*Psammophis subtaeniatus*	Western Yellow-Bellied Sand Snake
?	*Psammophis trinasalis*	Fork-Marked Sand Snake
?	*Psammophylax tritaeniatus*	Striped Grass Snake
*	*Prosymna sundevallii*	Sundevall's Shovel-Snout
√	*Pseudaspis cana*	Mole Snake
	Family: Elapidae	Cobras, Mambas and Others
*	*Aspidelaps scutatus scutatus*	Common Shield Cobra
*	*Dendroaspis polylepis*	Black Mamba
√	*Naja annulifera*	Snouted Cobra
√	*Naja mossambica*	Mozambique Spitting Cobra
	Family: Colubridae	
√	*Crotaphopeltis hotamboeia*	Red-Lipped Snake
√	*Dasypeltis scabra*	Common or Rhombic Egg Eater
√	*Dispholidus typus*	Boomslang
*	*Philothamnus natalensis occidentalis*	Western Natal Green Snake
√	*Philothamnus semivariegatus*	Spotted Bush Snake
√	*Telescopus semiannulatus semiannulatus*	Eastern Tiger Snake
*	*Thelotornis capensis capensis*	Southern Twig Snake

Probability of Occurrence	Scientific Name	English Name
	CLASS: AMPHIBIA	**AMPHIBIANS**
	Order: ANURA	FROGS
	Family: Pipidae	Clawed Frogs
?	*Xenopus laevis*	Common Platanna
	Family: Bufonidae	Toads
?	*Poyntonophrynus fenoulheti*	Northern Pygmy Toad
*	*Amietophrynus garmani*	Eastern Olive Toad
√	*Amietophrynus gutturalis*	Guttural Toad
?	*Amietophrynus maculatus*	Flat-Back Toad
*	*Schismaderma carens*	Red Toad
	Family: Hyperoliidae	Reed Frogs
?	*Hyperolius marmoratus taeniatus*	Painted Reed Frog
√	*Kassina senegalesis*	Bubbling Kassina
	Family: Breviceptidae	Rain Frogs
√	*Breviceps adspersus*	Bushveld Rain Frog
	Family: Microhylidae	Rubber Frogs
√	*Phrynomantis bifasciatus*	Banded Rubber Frog
	Family: Phrynobatrachidae	Puddle Frog
*	*Phrynobatrachus natalensis*	Snoring Puddle Frog
	Family: Ptychadenidae	Grass Frog
?	*Ptychadena anchietae*	Plain Grass Frog
?	*Ptychadena mossambica*	Broad-Banded Grass Frog
	Family: Pyxicephalidae	
?	*Amietia angolensis*	Common River Frog
√	*Cocosternum boettgeri*	Boettger's Caco or Common Caco
? NT	*Pyxicephalus adspersus*	Giant Bullfrog
*	*Tomopterna cryptotis*	Tremolo Sand Frog
√	*Tomopterna natalensis*	Natal Sand Frog

The probability of occurrence is indicated in the table above with the following symbols:

√ Definitely there or have a *high* probability of occurring;

* *Medium* probability of occurring based on ecological and distributional parameters;

? *Low* probability of occurring based on ecological and distributional parameters.

The red data rankings are shown in the first column (Branch, 2002; Minter *et al.*, 2004):

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened and DD = Data Deficient. All other species are considered to be of Least Concern (LC).

4.6.3 Endangered species

4.6.3.1 Mammals

A number of Red Data species have a medium probability of occurrence on the site namely the Juliana's golden mole, short-snouted elephant shrew, reddish-grey musk shrew, lesser red musk shrew, South African hedgehog and the brown hyena. The Juliana's golden mole is critically endangered while the South African hedgehog and brown hyena is considered to be near threatened.

Hedgehogs are listed as near threatened due to human interference. Considering the size of the district and connectivity it might be possible that a small population of hedgehogs may persist on site. Brown hyenas have been prosecuted to the point that they are considered to be near threatened. Brown hyenas are known to range far and wide and should be considered to be a vagrant visitor to the site.

The honey badger is considered to be near threatened and have a high probability of occurring on site.

Species that are listed as 'Data deficient" are not necessarily endangered. Not enough information is available on these species due to lack of study and are therefore listed as data deficient as a precautionary measure.

No other red data or sensitive species are expected to occur on site due to the fact that the area may fall outside the distributional ranges of some species, the site may be too disturbed or may not offer suitable habitat to specific species.

4.6.3.2 Birds

According to the Scientific Community

A total of 12 Red Data bird species may possibly occur on or around the site, given the quantity and quality of habitats available. The table below lists these species as well as the expected frequency of occurrence.

Table 18: The expected frequency of occurrence of Red Data species on and around the site.

Threatened Status	Species	Expected Frequency of Occurrence on Site			
		Regular resident	Frequent visitor	Erratic visitor	Infrequent vagrant
Near Threatened	European Roller			X	
	Black-winged Pratincole			X	
	Abdim's Stork			X	
Vulnerable	African Grass-Owl				X
	Verreauxs' Eagle				X
	Secretarybird			X	

	Lanner Falcon				X
Endangered	White-backed Vulture				X
	Cape Vulture				X
	Lappet-faced Vulture				X
	Tawny Eagle				X
	Martial Eagle				X
Total	**12**	**0**	**0**	**4**	**8**

The table below indicates the estimated suitability of habitats to support the basic requirements of threatened bird species on and around the site.

Table 19: Suitability of Habitats to Support the Basic Requirements of Threatened Bird Species

Threatened Status	Species	Potential Support for:			
		Movement	Feeding	Roosting	Breeding
Near Threatened	European Roller	M	M	P	N/A
	Black-winged Pratincole	M	M	A	N/A
	Abdim's Stork	M	M	M	N/A
Vulnerable	African Grass-Owl	P	A	P	A
	Verreauxs' Eagle	P	P	A	A
	Secretarybird	M	M	P	A
	Lanner Falcon	M	M	M	P
Endangered	White-backed Vulture	P	P	P	P
	Cape Vulture	P	P	P	A
	Lappet-faced Vulture	P	P	P	A
	Tawny Eagle	P	P	P	P
	Martial Eagle	P	P	P	P
Total	**12**	**M:5 ; P:7**	**M:5 ; P:6 ; A:1**	**M:2 ; P:8 ; A:2**	**P:4 ; A:5 ; N/A:3**

According to the Biodiversity Act No. 10 of 2004

Government Notice 2007 of the NEMBA (2004) list the following species as Red Data Species:

Endangered: White-backed Vulture, Cape Vulture, Lappet-faced Vulture.

Vulnerable: Tawny Eagle, Martial Eagle, African Grass-Owl.

Species selected for special conservation as Threatened or Protected Species (ToPS, 2015) are: Tawny Eagle, Lappet-faced Vulture, Cape Vulture and Martial Eagle.

No threatened species are expected to occur on site other than for a temporary visit.

4.6.3.3 Herpetofauna

The site falls inside the natural range of the South African python. The study site provides suitable habitat for the Southern African python, but it is considered to be too small to support a viable population as a single python is estimated to require at least 100 Ha of foraging area.

The Southern African python's national status has changed from Vulnerable (Branch, 1988) to regionally of Least Concern (Alexander, 2014), although it is currently still a ToPS-listed species (Threatened or Protected Species).

The site provides potential breeding places for giant bullfrogs in the form of temporary wetlands with gentle slopes and sandy soil for burrowing. It is important to note that in the latest literature (Measey, 2011, Carruthers & Du Preez, 2011) the giant bullfrog's status has changed officially from Near Threatened (Minter *et al.*, 2004) to Least Concern in South Africa, although it is currently still a ToPS-listed species.

4.7 Surface water

4.7.1 Catchment areas

The site is located within the A61C quaternary catchment area as shown in the figure below. This area falls within the Limpopo Water Management Area (WMA). The Limpopo water management area represents part of the South African portion of the Limpopo Basin (DWAF, 2004). The water management area borders on Botswana and Zimbabwe, where the Limpopo River forms the international boundaries before flowing into Mozambique. Limited sites are available for the construction of major dams due to the aridity and flatness of the terrain. Subsequently, the surface water potential has largely been fully developed. Groundwater is used extensively as relatively favourable formations of groundwater are found in the area. However, overexploitation occurs in localised areas (DWAF, 2004).

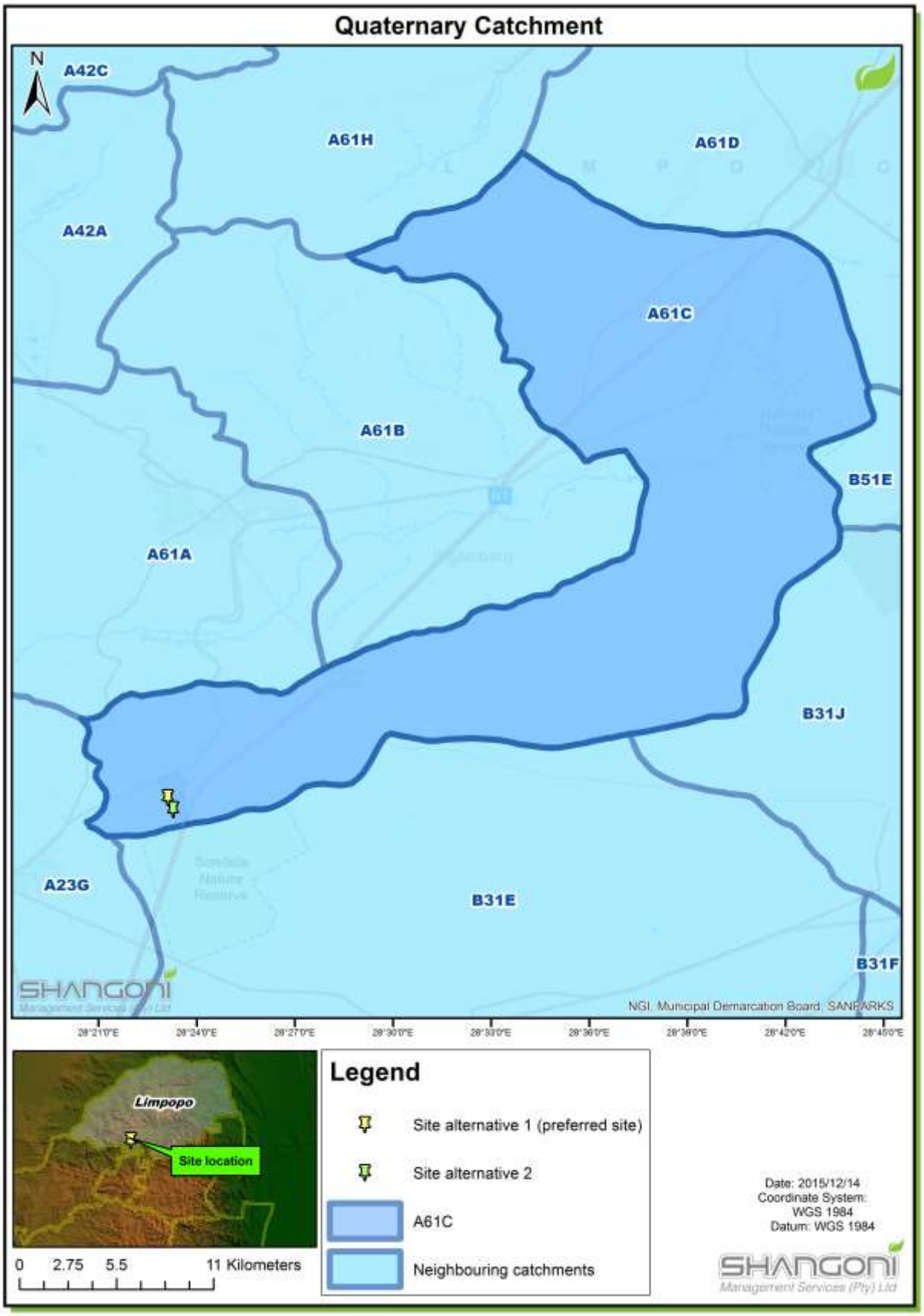


Figure 15: Quaternary Catchment in which the site is located

4.7.2 Mean annual runoff (MAR)

The total Mean Annual Runoff for the Upper Vaal Water Management Area is 986 million m3/annum and the Ecological Reserve is 156 million m3/annum (DWAF, 2004).

4.7.3 Surface water quality, quantity and use

No surface water is used on site. Surface water quality sampling has been done by Dr James Meyer. The last sampling was done on the 27th of May 2014. No samples could since be taken as the surface water source was dry (Meyer, 2015).

4.7.4 Water authority

The relevant water authority is the Department of Water and Sanitation, Limpopo Regional Office.

4.8 Groundwater

4.8.1 Aquifer type

The groundwater recharge ranges between 4 and 5mm per annum and the baseflow ranges between 2 and 12mm per annum in the area of the site (DWA, 2010).

4.8.2 Depth of water tables

The depth of the water level is approximately 16.8-18.8mbgl (metres below ground level) in the area of the site (DWA, 2010).

4.8.3 Boreholes and springs

Three boreholes are currently used on site. The locations of the boreholes are shown in the table below:

Table 20: Boreholes present on site

Borehole	Location
Borehole 1: Grower Unit	24°50’20.94” S, 28°23’21.04” E
Borehole 2: Sow Unit	24°50’39.27” S, 28°23’35.76” E
Borehole 3	24°50’14.20” S, 28°23’31.64” E

Borehole 2 will be used to supply water to the new wean-to-finish site.

4.8.4 Groundwater quality

The following groundwater quality results were obtained during monitoring (Meyer, 2015). The full report is attached under Appendix D. The samples were taken on the 16th of November 2015.

Table 21: Groundwater Quality Data for the Boreholes Present on Site

Parameter	Unit	Borehole 1	Borehole 2	Borehole 3
Total Bacteria Count	(count/mℓ)	135	265	680
Coliform Bacteria Count	(count/100mℓ)	5	3	43
E. coli	(count/100mℓ)	0	2	1
Faecal Coliforms	(count/100mℓ)	0	2	3
Total Dissolved Solids	mg/ℓ	211	171	287
Phosphate		0.02	0	0
Total Hardness		97	97	166
Nitrate		16.3	15.7	7
Potassium		2.1	1.4	3.03
Fluoride		0.29	0.28	0.21
Nitrite		0	0	0
Chloride		9	6	9
Sulphate		2	4	5
Carbonate		0	0	0
Bicarbonate		208	147	306
Sodium		40	33	46
Calcium		32	30	56
Magnesium		3	5	6
pH		7.86	7.79	7.84
Arsenic	µg/ℓ			
Beryllium				
Bismuth				
Boron				
Barium				
Bromide				
Cadmium				
Copper				
Cobalt				
Chromium				
Caesium				
Iodine				
Iron		60	50	50
Lead				
Lanthanum				
Lithium				
Mercury				

Parameter	Unit	Borehole 1	Borehole 2	Borehole 3
Manganese				
Molybdenum				
Nickel				
Selenium				
Sr				
Tellurium				
Thallium				
Titanium				
Antimony (Sb)				
Tin (Sn)				
Tungsten (W)				
Uranium				
Vanadium				
Zinc				

The data for Ammonia, Chemical Oxygen Demand, Suspended Solids and Surfactants were not available at the time the report was written. Historical data () for these parameters is shown in the table below.

Table 22: Historical Groundwater Quality Data

Parameter	Unit	Borehole 1	Borehole 2	Borehole 3
Ammonia (as N)	mg/ℓ	1.161	0.091	0.162
Chemical Oxygen Demand (as O_2)	mg/ℓ	28.9	<10	48.7
Suspended Solids	mg/ℓ	<5	<5	<5
Surfactants	mg/ℓ	0.1	<0.1	<0.1

4.9 Sensitive landscapes

A wetland and/or riparian delineation and functional assessment was conducted by Limosela Consulting (Pty) Ltd during November 2015 (Appendix D). The field assessment was conducted on the 18th of November 2015. One wetland area was identified on the farm more than 500 metres from both alternative sites identified for the construction of the piggery (Northerly direction).

4.9.1 Wetland and Riparian Delineation

Wetlands are identified based on the following characteristics (DWAF, 2005):

- The presence of hydrophytes (plants adapted to or tolerant of saturated soils);
- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation; and
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing within 50cm of the soil surface.

4.9.2 Wetland Classification and Delineation

The wetland identified in the area of the site can be classified as an unchannelled valley bottom wetland. The valley floor is a depositional environment composed of fluvial or colluvial deposited sediment. These systems tend to be found in the upper catchment areas, or at tributary junctions where the sediment from the tributary smothers the main drainage line.

4.9.3 Buffer Zones

A buffer zone can be defined as a strip of land surrounding a wetland or riparian area in which activities are controlled or restricted (DWAF, 2005). Protective buffer zones are calculated form the outer edge of the temporary zone of a wetland, or edge of the riparian habitat. The buffer zone, of 50m, identified for the wetland on site serves to highlight an ecologically sensitive area.

4.10 Sites of archaeological and cultural interest

4.10.1 Archaeological Impact Assessment (AIA)

An Archaeological Impact Assessment (AIA) was conducted by APelser Archaeological Consulting during November 2015 (Appendix D). The archaeological impact assessment involved the identification of all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) that may be influenced by the development, assessing the significance of the cultural resources, describing the possible impact of the proposed development on the resources, describing possible mitigation measures as well as reviewing the applicable legislative requirements. The impact assessment consisted of literature reviews and a field assessment.

During the field assessment, no sites, features or artifacts of cultural heritage (archaeological or historical) origin or significance were found. The site has been largely disturbed by recent agricultural activities such as ploughing and crop growing which might have led to the disruption or destruction of any features that may have been present on the site. Furthermore, the area is characterized by sandy soils which decreases the likelihood that this area was used for building in the archaeological past.

4.10.2 Palaeontological Impact Assessment (PIA)

Gideon Groenewald conducted a desktop Palaeontological Impact Assessment (PIA) during October 2015 (Appendix D). The assessment aimed to identify exposed and subsurface rock formations that are considered to be palaeontological significant, to assess the level of significance of any

palaeontologically formations present on the site, to comment on the impact of the development on these exposed and/or potential fossil resources and to make recommendations on the conservation and damage mitigation to be implemented during the development.

Geological maps were used to assess the potential fossiliferous rock units represented within the study area. The known fossil heritage within each rock unit is inventoried from the published scientific literature and previous palaeontological impact studies in the same region.

The impact of the proposed development on fossil heritage is determined on the basis of the sensitivity of the rock units present on the site and the nature and scale of the development. Sensitivity class are described in the table below:

Table 23: Palaeontological sensitivity classification

Palaeontological significance / Vulnerability of Rock Units	
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond *et al.* (2008) and Groenewald *et al.* (2014).	
Red	Very High Palaeontological sensitivity/vulnerability. Development will most likely have a very significant impact on the Palaeontological Heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
Orange	High Palaeontological sensitivity/vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and phase I Palaeontological Impact Assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
Green	Moderate Palaeontological sensitivity/vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example, areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the Palaeontological Heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and phase I PIA (ground proofing of desktop survey) recommended.
Blue	Low Palaeontological sensitivity/vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of Life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of Life in the region.

	Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. Collection of a representative sample of potential fossiliferous material recommended.
Grey	Very Low Palaeontological sensitivity/vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during implacement of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits.

The PIA included the following:

- An analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units;
- A review of all relevant palaeontological and geological literature, including geological maps and previous palaeontological impact reports;
- Data on the proposed development provided by the developer; and
- Where feasible, location and examination of any fossil collections from the site.

The site is underlain by the Clarens Formation that consists of fine-grained Aeolian sandstone. This formation is also known for the presence of vertebrate fossil remains of mostly dinosaur fossils. However, due to deep soil cover in the study area, little information is available on fossils of this region.

According to the SAHRIS PalaeoSensitivity Map (2015), the site is located within an area with high palaeontological sensitivity as shown in the figure below.

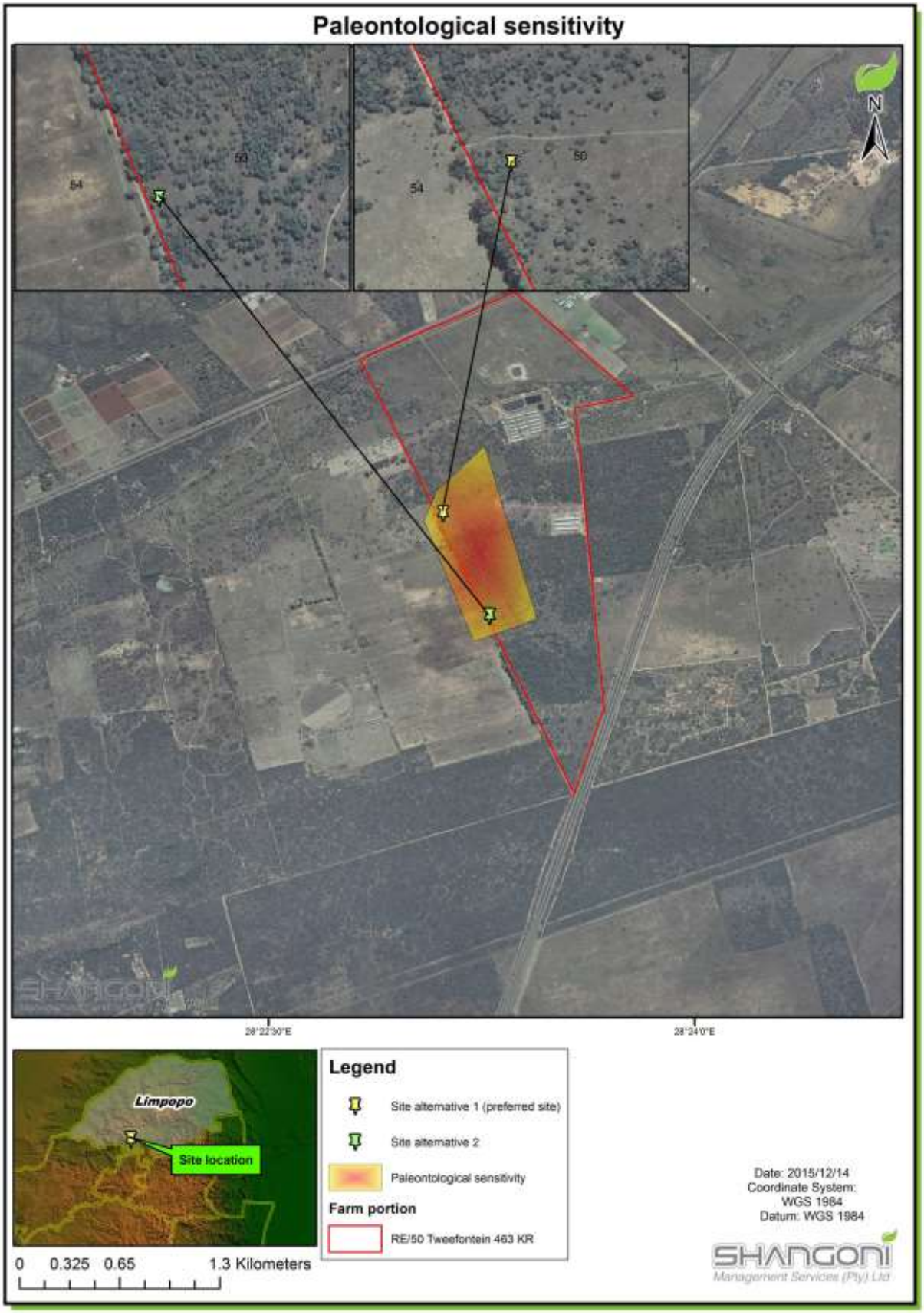


Figure 16: Palaeontological sensitivity of the site

4.11 Air Quality

The site proposed for the establishment of the new piggery is located within the Waterberg Airshed Priority Area. The Waterberg District was declared a priority area on the 15th of June 2012. As a priority area, the area is considered to exceed ambient air quality standards and cause a significant negative impact on air quality and human health. The Waterberg is, however, currently not an air pollution "hot spot", though developments are anticipated in the future that may result in severe air pollution problems. The area has therefore been declared as a priority area as a proactive and preventative approach.

According to the Waterberg Airshed Priority Area Air Quality Monitoring Plan (2015) the main sources of air quality pollution are:

- Dust from mines, quarries, brickworks, spoil/overburden heaps and heavy vehicles driving on gravel roads;
- The burning of solid waste at waste disposal sites, informal waste dumps on farms and at tourism facilities in natural areas; and
- Smoke from vehicles particularly heavy vehicles driving in urban areas.

4.12 Noise

The farms adjacent to the project site are used for crop production and livestock raising. The sources of noise in the area surrounding he project site are therefore agricultural in nature. The N1 highway is located South-east of the project site. Vehicles travelling on this road are also sources of noise in the area.

4.13 Visual aspects

As the site is covered with tall trees, it is unlikely that the new piggery will cause visual impacts on the adjacent landowners.

4.14 Socio-economic aspects

4.14.1 Demography

According to the 2011 census, 66 500 people formed part of the 18 068 households in the Bela-Bela Local Municipality. The average household size is 3.7 people per household. The growth rate in the municipality is 2.44% per annum. There are 103.1 men for every 100 women in the municipality (Statistics South Africa, 2011). The table below shows the age structure of the municipality.

Table 24: Demographic Profile of the Bela-Bela Local Municipality (Statistics South Africa, 2011)

Age Group	Percentage of Population (%)
Under 15 years of age	28.1
15 to 64 years of age	66.0
Over 65 years of age	5.9
Total	**100**

4.14.2 Major economic activities

According to the Bela-Bela Local Municipality's Integrated Development Plan (2015/16), the main economic activities in the municipality are finance, insurance, real estate and business services as well as trade (wholesale and retail), catering and accommodation. The financial sector contributes to 33.2% of the Gross Domestic Product (GDP) within the Bela-Bela Local Municipality while trade, catering and accommodation contribute to 15.9% of the GDP. Agriculture, forestry and fishing contribute to 5% of the GDP.

4.14.3 Unemployment and employment

The 2011 census found that the official unemployment rate was 22.5% and the youth unemployment rate (15 to 34 years of age) was 29.8%. The dependency ratio was 51.6 per 100 people between the ages of 15 and 64 years (Statistics South Africa, 2011).

5. PUBLIC PARTICIPATION PROCESS

5.1 Objectives of the Public Participation Process (PPP)

Section 24 of the Constitution of the Republic of South Africa, 1996 guarantees everyone the right to an environment that is not harmful to their health and well-being and to have the environment protected for the benefit of present and future generations. In order to give effect to this right, NEMA came into effect.

In terms of Section 24(4) of NEMA, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment must, *inter alia*, ensure, with respect to every application:

- Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state.
- That the findings and recommendations flowing from an investigation, the general objective of integrated management laid down in NEMA and the principles of environmental management set out in Section 2 of NEMA are taken into account in any decision made by the organ state in relation to any proposed policy, programme, process, plan or projects, consequences or impacts.
- Public information and participation procedures which provide all integrated and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures.

One of the general objectives of integrated environmental management laid down in Section 23(2) (d) of NEMA is to: “ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.”

The National Environmental Management Principles as stipulated in NEMA say;

- “Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have an opportunity to develop the understanding, skills and capacity necessary to achieve equitable and effective participation, and participation by vulnerable and disadvantage persons must be ensured”.

5.2 Legislation and guidelines followed for the PPP

The public participation process for this project was conducted by Shangoni Management Services in terms of:

- The procedures and provisions in terms of the NEMA;
- Chapter 6 of the 2014 EIA Regulations;
- GN 807 of 2012; Public Participation Guideline; and
- Other relevant legislation such as the Promotion of Access to Information Act (PAIA), 2000.

Refer to Appendix E for an extract regarding the required public participation process to be followed, taken from the relevant legislation and guidelines

5.3 Public Participation Process followed

5.3.1 Identification and registration of I&APs and key stakeholders

Table 25 below lists the landowners and adjacent landowners identified and notified (by means of e-mail, telephone, fax and/or post) of the proposed project. Copies of the notifications to the I&APs have been included in Appendix E.

Table 25: List of landowners and adjacent landowners identified and notified

Farm Name	Title Deed	Owner's Details
Remainder of the farm Tweefontein 462 KR	T57445/1992	Adinvale Farming Estates (Pty) Ltd
Portion 62 of the farm Tweefontein 462 KR	T16614/2009	SANRAL
Portion 67 of the farm Tweefontein 462 KR	T85646/1995	Adinvale Farming Estates (Pty) Ltd
Remainder of the farm Tweefontein 463 KR	T23470/1978	Pieter Frederik Minnaar
Portion 13 of the farm Tweefontein 463 KR	T30275/1996	Geordon Properties CC
Remaining extent of Portion 42 of the farm Tweefontein 463 KR	T60824/2001	Talco Promotions
Portion 43 of the farm Tweefontein 463 KR	T6576/2014	HMJ Technologies CC
Remaining extent of Portion 44 of the farm Tweefontein 463 KR	T39038/2015	Marinette Goosen Hendrik Petrus Jacobus Goosen
Portion 47 of the farm Tweefontein 463 KR	T56085/2015	Thomas Stephens van Staden
Portion 52 of the farm Tweefontein 463 KR	T65173/1997	Bosveld Distriksraad
Portion 56 of the farm Tweefontein 463 KR	T6576/2014	HMJ Technologies
Portion 90 of the farm Tweefontein 463 KR	T56494/1999	Edward Charles Lightfoot
Portion 112 of the farm Tweefontein 463 KR	T28658/2007	SANRAL
Portion 115 of the farm Tweefontein 463 KR	T28657/2007	SANRAL
Portion 116 of the farm Tweefontein 463 KR	T114808/2005	Hagne Bush Lapa (Pty) Ltd
Portion 124 of the farm Tweefontein 463 KR	T38443/2008	Shona Bosveld CC
Portion 130 of the farm Tweefontein 463 KR	T45186/2000	Omewachem CC
Portion 131 of the farm Tweefontein 463 KR	T50628/2003	Johan Carl de Beer
Portion 132 of the farm Tweefontein 463 KR	T75665/2014	Josta Shimane Dladla Thato Bareng Dladla

All organs of state which may have jurisdiction in respect of the proposed project is considered to be registered I&APs.

The following organs of state were notified of the proposed project:

- Department of Water and Sanitation;
- South African Heritage Resources Agency;
- Limpopo Department of Cooperative Governance and Traditional Affairs;
- Limpopo Department of Health;
- Waterberg District Department of Health;
- Department of Energy;
- Department of Mineral Resources;
- Department of Public Works, Roads and Infrastructure;
- Roads Agency Limpopo;
- Directorate of Land Use and Soil Management;
- Chief Directorate: Animal Production and Health;
- Bela-Bela Local Municipality;
- Waterberg District Municipality;
- Limpopo Department of Agriculture and Rural Development;
- Limpopo Department of Agriculture – Waterberg District;
- Eskom;
- Transnet; and
- SANRAL.

Copies of the notifications to the organs of state have been included in Appendix E, and examples are included in Figure 17 below.

5.3.2 Methods of notification

5.3.2.1 Advertisement(s)

The proposed project was advertised in a local newspaper, The Post, on the 29th of July 2016. The Post was found to be the most appropriate newspaper in terms of its accessibility to the I&APs. A copy of the advertisement and proof of the placement thereof is attached in Appendix E. Refer also to Figure 18 below.

5.3.2.2 Placement of site- and public notices

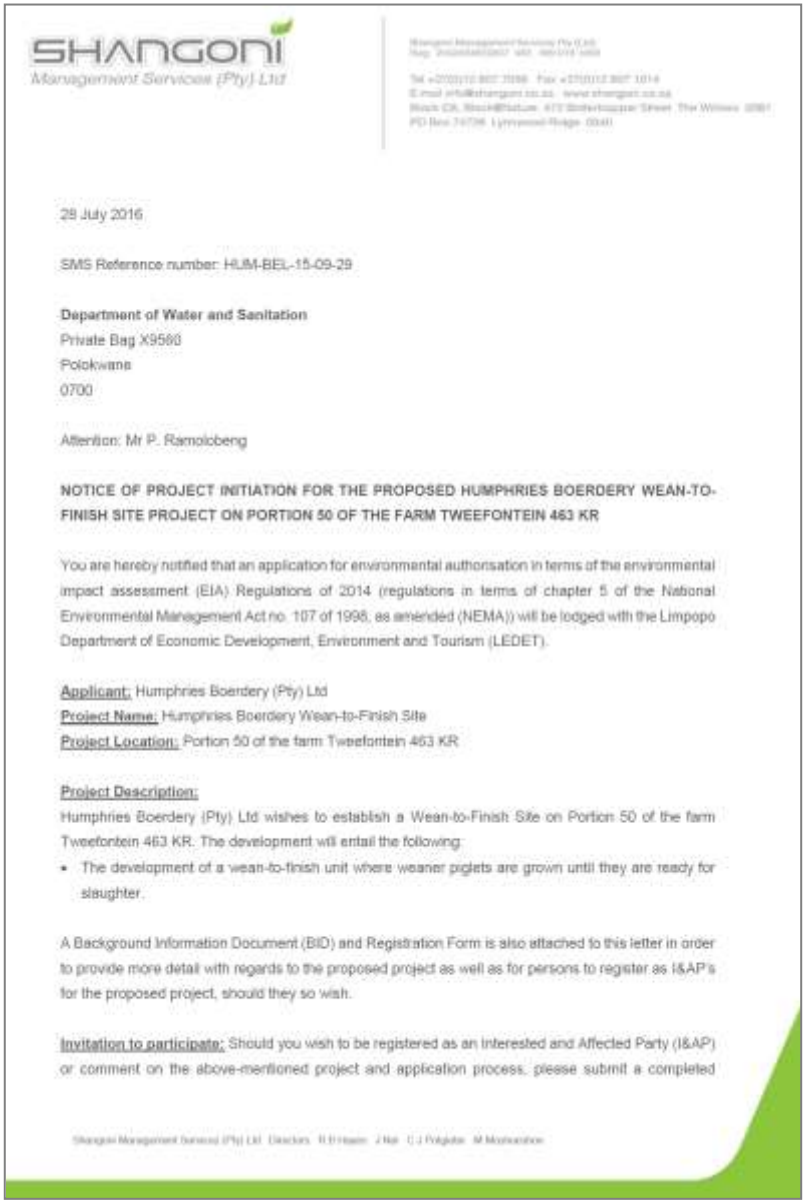
Notice was also given to Interested and Affected Parties (I&APs) by notice boards. Notice boards were placed at 5 different, noticeable and conspicuous places on the 28th of July 2016. A copy of the site notice and photographs of the site notices are attached in Appendix E. Refer also to Figure 19 below.

5.3.2.3 Background Information Document

The Background Information Document (BID) developed for the proposed project provides background information pertaining to the project and is intended to inform I&APs of the proposed project. The BID also includes a registration form which I&APs, stakeholders and organs of state are encouraged to complete in order to register as an I&AP for the proposed project.

The BID was made available on the 28th of July 2016 to all landowners within and surrounding the site on which the proposed project will be undertaken, as well as to all organs of state that may have jurisdiction over any aspect of the activity. The BID will also be made available to any other person who becomes involved in the on-going Public Participation Process.

Copies of the BID and proof of distribution of the BID to the adjacent landowners and organs of state have been attached as Appendix E.



SHANGONI
Management Services (Pty) Ltd

28 July 2016

SMS Reference number: HUM-BEL-15-09-29

Department of Water and Sanitation
Private Bag X9560
Polokwane
0700

Attention: Mr P. Ramolobeng

NOTICE OF PROJECT INITIATION FOR THE PROPOSED HUMPHRIES BOERDERY WEAN-TO-FINISH SITE PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR

You are hereby notified that an application for environmental authorisation in terms of the environmental impact assessment (EIA) Regulations of 2014 (regulations in terms of chapter 5 of the National Environmental Management Act no. 107 of 1998, as amended (NEMA)) will be lodged with the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Applicant: Humphries Boerdery (Pty) Ltd
Project Name: Humphries Boerdery Wean-to-Finish Site
Project Location: Portion 50 of the farm Tweefontein 463 KR

Project Description:
Humphries Boerdery (Pty) Ltd wishes to establish a Wean-to-Finish Site on Portion 50 of the farm Tweefontein 463 KR. The development will entail the following:

- The development of a wean-to-finish unit where weaner piglets are grown until they are ready for slaughter.

A Background Information Document (BID) and Registration Form is also attached to this letter in order to provide more detail with regards to the proposed project as well as for persons to register as I&AP's for the proposed project, should they so wish.

Invitation to participate: Should you wish to be registered as an Interested and Affected Party (I&AP) or comment on the above-mentioned project and application process, please submit a completed

Shangoni Management Services (Pty) Ltd

Registration Form (attached to this letter) or your name, contact information, and interest in the matter, in writing, to the contact person below, by the **15th of August 2016** (14 Days), in order for us to notify you of the availability of the Draft Basic Assessment Report. Please note that you are welcome to register as an Interested and Affected Party at any stage during the public participation process.

Where to obtain more information: To obtain additional information please contact the Environmental Assessment Practitioner at the details provided below.

Environmental Assessment Practitioner:
Shangoni Management Services (Pty) Ltd
PO Box 74726, Lynnwood Ridge, Pretoria, 0040
Contact Person: **Karien Venter**
Tel: 012 807 7036, Cell: 079 892 8858, Fax: 012 807 1014, E-mail: karien@shangoni.co.za

For online participation go to www.shangoni.co.za and click on the "Public Documents" link.

Regards,

Karien Venter
Shangoni Management Services

Figure 17: Notification Letter

diepos.linmedia.co.za / www.diepos.co.za KLEIN ADV. / SMALLS DIE POS/THE POST 29 Julie, 2016 Bladsy 21

HUMPHRIES BOERDERY WEANER TO FINISH SITE PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR (SMS Reference number: HUM-BEL-15-09-29)

The purpose of this Background Information Documents (BID) is to provide information to Interested and Affected Parties (I&APs) about potential decisions that may affect them and to afford I&APs an opportunity to influence those decisions in the environmental authorisation process for the proposed Humphries Boerdery (Pty) Ltd: Humphries Boerdery Wean-to-Finish Site Project.

BACKROUND TO THE PROJECT: Humphries Boerdery (Pty) Ltd is an established pig farm near Bela Bela in the Limpopo Province. The farm is located on Portion 50 of the Farm Tweefontein 463 KR. Humphries Boerdery has been operational for more than 22 years. The pig farm currently houses approximately 17 500 pigs in 29 houses. The farm is also equipped with a biodigester used for the treatment of wastewater generated at the piggery. Humphries Boedery wishes to establish a wean-to-finish site. The development will entail the following: The development of a wean-to-finish unit where weaner piglets are grown until they are ready for slaughter. The pigs are called baconers. The construction of seven (7) wean-to-finish platforms. Each platform will have one (1) house and each house will have one (1) room (therefore a total of 7 rooms). Each room houses 810 wean-to-finish pigs. The total capacity within the wean-to-finish rooms is therefore 5 670 baconers. The dimensions of one platform: 12m x 67.5m (810m²) x 7 platforms = 5 670m². The total footprint size of all the wean-to-finish platforms is therefore 5 670m² (0.567ha). The total development footprint, including the platforms and open spaces between and surrounding the platforms is: 205m x 100m = 20 500m² (2.05ha). The construction of an office block that will include a store room and ablution facilities. The office block will have the following dimensions: 5m x 10m (50m²). The following describes the basic process that will be followed to raise the baconer pigs: Weaner piglets will be delivered to the wean-to-finish unit at three weeks of age. Each fourth week, 810 weaner piglets will be delivered. Once the pigs are 21-24 weeks old, they will be collected and taken to an abattoir for slaughter. LEGISLATIVE REQUIREMENTS: Procedure applied to the application: As the project activities require the development of new infrastructure, a Basic Assessment (BA) process will be required in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended, for the authoorisation of listed activities contained in GNR 983 of 4 December 2014 and GNR 985 of 4 December 2014 published in terms of Section 24(2) and 24D of the NEMA. Application to the competent Authority: An application for authorisation in terms of the NEMA, as amended, and the Environmental Impact Assessment Regulations, 2014, for the proposed activities will be submitted to the Limpopo Department of Economic Development, Environment and Tourism (LEDET) at a later stage in this process. Listed activities applied to the application: The listed activities which have been applied for include Listed activities 4(ii) and 27 of GNR 983. Legislation associated with the application: South African legislation requires that a Basic Assessment Report and an Environmental Management Plan (EMP) be compiled in accordance with the National Environmental Mnagement Act (Act No. 107 of 1998) (NEMA), as amended. In order to do so, Humphries Boerdery (Pty) Ltd has appointed SHANGONI MANAGEMENT SERVICES (Pty) Ltd (Shangoni) as the Independent Environmental Assessment practitioner (EAP) in terms of Regulation 12 of GNR 982, to undertake and manage the processes to apply for the required environmental authorisations. Furthermore, SHANGONI meets the requirements set out in Regulation 13 of GNR 982.

PUBLIC PARTICIPATION: People have the right to be informed about potential decisions that may affect them and to be afforded an opportunity to influence those decisions. Register as an I&AP: You may be an I&AP for the proposed project, or to obtain more information or submit comments, please complete the Registration Form (provided in this BID) and return it to SHANGONI at the details provided below before the 15th August 2016, in order for us to notify you of the availability of the Draft Basic Assessment Report.

Please note that you are welcome to register as an Interested and Affected Party at any stage during the public participation process.

Availability of the draft Basic Assessment Report: A draft Basic Assessment Report will be made available to the public for review for a period of thirty (30) days at a later stage in this application process. An electronic copy of the draft Basic Assessment Report will also be posted on the SHANGONI MANAGEMENT SERVICES (Pty) Ltd website (www.shangoni.co.za) for public comment for the same period of thirty days.

Where to obtain more information: To obtain additional information, please contact the EAP at the details provided below: Environmental Assessment Pretitioner: SHANGONI MANAGEMENT SERVICES (Pty) Ltd. Contact person: Karien Venter; Tel: 012 807 7036; Mobile: 079 892 8858; E-mail: karien@shangoni.co.za; Fax: 012 807 1014; Postal address: P.O. Box 74726, Lynnwood Ridge, 0040.

NOTICE OF PROJECT INITIATION FOR THE PROPOSED

Figure 18: Newspaper advertisement

a

b

c

d

e

f

g

Figure 19(a-g): Notice Boards

5.3.3 I&AP's register

Once all landowners, adjacent landowners, organs of state and the public were notified of the proposed project, an I&AP's register (as provided in Appendix E) was compiled. Table 26 below provides an extract of the I&AP's Register indicating the organs of state and other I&AP's that have been registered.

Table 26: Registered I&AP's

No.	Name	Department
Organs of State		
1.	Mr Phuthi Ramolobeng	Department of Water and Sanitation
2.	Mr Ruben Mashego	Waterberg District Municipality
3.	Feziwe Raphela	Waterberg District Municipality: Municipal Manager
4.	Stanley Koenaite	Waterberg District Municipality: Air Quality Officer
5.	Mr T.J. Mothapo	Bela-Bela Local Municipality
6.	Mr M.G. Makoko	Limpopo Department of Cooperative Governance, Human Settlements and Traditional Affairs
7.	Mr M.E. Modiba	Limpopo Department of Health
8.	Mr Richard Tredway	Waterberg District Department of Health
9.	Mr Gibson Thisikhane	Department of Energy
10.	Mr T. Kolani	Department of Mineral Resources
11.	Ms Ditebogo Thindiza	Department of Public Works, Roads & Infrastructure
12.	Mulaudzi Thabelo	Roads Agency Limpopo
13.	Ms R.L. Bosoga / Mr Foletji Mahlakoane	Directorate of Land Use and Soil Management
14.	Mr M.J. Mamabolo, Dr T. Songabe, Dr M. Maja	Chief Directorate: Animal Production and Health
15.	Tele Maphoto	Limpopo Department of Agriculture and Rural Development
16.	Mr B.F. Greeff	Limpopo Department of Agriculture – Waterberg District
17.	Mr Roger Stones	Eskom
18.	To be announced	South African Heritage Resources Agency (SAHRA)
19.	Ms Cynthia Nongo	Transnet
20.	Mr Thabo Mahlakwana	SANRAL
No.	**Name**	**Interest**
Registered I&AP's		
1.	Mr Hendrik Petrus Jacobus Goosen	Adjacent Landowner
2.	Ms Lorraine Egan	Botanical Society of South Africa – Limpopo Branch
3.	Mr Johannes Christoffel de Beer & Mr Johannes Hendrik Willem Petrus de Beer	Adjacent Landowner
4.	Mr Emil Frederich Oettle	Adjacent Landowner

Refer also to Appendix E for a detailed I&AP's Register including contact information for all registered organs of state and I&AP's.

5.3.4 Public meeting(s)

No public meetings have been held. The public will be notified if a public meeting will be held.

5.3.5 Access and opportunity to comment on written submissions

The BAR was made available to the public for review for a period of thirty (30) days, from the 19th of August 2016 to the 20th of September 2016. An electronic copy of the draft Basic Assessment Report was also posted on Shangoni Management Services' website (www.shangoni.co.za) for public comment for the same period of thirty days. A copy of the document was also submitted to DWS for review.

In terms of Section 40(3) of the EIA Regulations, 2014, interested and affected parties will be provided another opportunity to comment on the Draft Basic Assessment Report.

5.3.6 Consultation with the relevant Authorities

5.3.6.1 Authorities meeting(s)

No meeting has been held with the competent authority (the Limpopo Department of Economic Development, Environment and Tourism) to date, nor is any meeting anticipated at this stage.

5.3.6.2 Application form in terms of the NEMA

The applicable Environmental Authorisation application form under NEMA, as amended, and the Environmental Impact Assessment Regulations, 2014, for the proposed activities was submitted to the Limpopo Department of Economic Development, Environment and Tourism (LEDET) on the 1st of November 2016. A reference number (12/1/9/1-W125) was be issued by LEDET on the 3rd of November 2016. The letter of acknowledgement indicating the above mentioned reference number is attached as Appendix G.

5.3.7 Comments and responses

All issues, comments and questions received from the I&APs up to date have been summarised in Table 27 below. Copies of the comments received have also been included in Appendix E.

Table 27: Comments and Responses Report

Name of contact person	Company	Date	Method of comment	Issue raised	Response
Ms Cynthia Nong	Transnet	28/07/2016	Email	Transnet Freight Rail hereby wishes to state its concerns regarding the following: 1. Air emissions from the facility; 2. Water usage by the facility seeing the status of water in South Africa; 3. Also it is not exactly clear as to the exact proximity of the proposed facility towards the existing TFR operations premises. The objections or non-objections of this project will depend on clarities provided on point 1 and 2 above as well as on 3.	Dear Cynthia Your e-mail received on the 28th of July 2016 refers: We hereby confirm receipt of your Interested and Affected Party Registration form and that you have been registered as an Interested and Affected Party for the Humphries Boerdery Wean-to-Finish Site Project. You will henceforth receive all correspondence regarding public participation opportunities as the process unfolds. We also take note of your comments. They will be included in the subsequent reports for this project. Please note that the questions you raised will also be addressed in the reports for this project and will be sent for public review in due course. Please do not hesitate to contact me should you have any further questions.
Mr H.P.J. Goosen	Adjacent Landowner	29/07/2016	Email	With the current biodigester in place we still experience bad smells from time to time. With the increased pig waste due to this project, will the capacity of the biodigester be increased?	Dear Hennie Your e-mail received on the 29th of July 2016 refers: We hereby confirm receipt of your Interested and Affected Party Registration form and that you have been registered as an Interested and Affected Party for the Humphries Boerdery Wean-to-Finish Site Project. You will henceforth receive all correspondence regarding public participation opportunities as the process unfolds. We also take note of your comments. They will be included in the subsequent reports for this project. Please note that the biodigester have been designed to accommodate the increased capacity in piggery waste that will be generated at the site. The capacity of the biodigester will therefore not be increased as part of this project. Please do not hesitate to contact me should you have any further questions.
Mr Foletji Mahlakoane	Department of Agriculture, Forestry and Fisheries: Land Use and Soil Management	04/082016	Telephonic and email	**1st comment:** I would like to visit Humphries Farm on the 19th of August to get a sense of what is happening for this project. **2nd comment:** I will comment after I have visited the site on 19 August 2016. **3rd comment:** Yes I wish to come to the farm at 10:00. Thanks for the update.	**1st response:** The client indicated that he is available for a site visit on the 19th of August. How late do you want to visit the site? Will you be able to meet us at the farm? **2nd response:** Your e-mail received on the 5th of August 2016 refers: We hereby confirm receipt of your Interested and Affected Party Registration form and that you have been registered as an Interested and Affected Party for the Humphries Boerdery Wean-to-Finish Site Project. You will henceforth receive all correspondence regarding public participation opportunities as the process unfolds. We also take note that you will send your comments on the project after you have visited the site on the 19th of August 2016. Please do not hesitate to contact me should you have any further questions.
Ms Lorraine Egan	Botanical Society of South Africa	12/08/2016	Email	As Limpopo BotSoc, our primary concern is the protection of indigenous flora, particularly rare or threatened species or plant communities. Any further botanical data on the proposed site would be appreciated.	Your e-mail received on the 12th of August 2016 refers: We hereby confirm receipt of your Interested and Affected Party Registration form and that you have been registered as an Interested and Affected Party for the Humphries Boerdery Wean-to-Finish Site Project. You will henceforth receive all correspondence

Name of contact person	Company	Date	Method of comment	Issue raised	Response
	– Limpopo Branch				regarding public participation opportunities as the process unfolds. We also take note of your comments. They will be included in the subsequent reports for this project. Please note that additional botanical information relevant to the project will be included in the reports for this project and will be sent for public review in due course. Please do not hesitate to contact me should you have any further questions.
Emil Frederich Oettle	Adjacent Landowner	17/08/2016	Email	Die “biodigester” is nie effektief nie, want die varkplaas se stank is verskrilik erg wanneer die suidewind waai. Dit stel my in die verleentheid teenoor my gaste en doen afbreuk aan die beeld van ‘n rustige bosveld omgewing wat ons hier probeer skep. Daar is sekerlik geen rede waarom al die bure (die plasies is relatief klein en huis dus naby mekaar) verontrief hoef te word deur een boer se bedrywighede nie. Sy boerdery is juis vroeër gedwing om weg van Bela-Bela te verskuif. Geen besoekers word op sy plaas toegelaat nie en dit is onmoonltik om by hom te kla oor die stank nie. Wanneer jy die heel dag aan die reuke van varke blootgestel word, pla die reuk jou in elk geval later nie meer nie. Ek stel voor hy skuif sy uitbreiding verder in die rigting van Settlers waar die plase baie groot is en bure ver van mekaar of woon. Daar is talle gasteplase en karavaanparke op die Eersbewoonpad en ek stel voor dat julle almal in a radius van 5km om die Humphries plaas om kommentaar nader. *Translated from Afrikaans* The biodigester is not effective as the smell from the pig farm is very bad when the wind is coming from the South. It embarrasses me in front of my guests and detracts from the image of a peaceful bushveld environment that me try to establish here. There is surely no reason why all the neighbours (the farms are relatively small and the houses close to each other) should be inconvenienced through one farmer’s activities. His farming activities were already forced to move away from Bela-Bela. No visitors are allowed on the farm and it is impossible to complaint with him with regards to the smell. When you are exposed to the smell of pigs all day, you don’t smell it anymore. I suggest that he moves his extension further away in the direction of the settlers where the farms are larger and neighbours live far from each other. There are a number of guest farms and caravan parks on the Eersbewoon Road and I suggest that you approach everyone within a radius of 5km around the Humphries Farm for commentary.	Dear Mr Oettle I am replying to you in English for record purposes with you consent as per our telephonic conversation on the 18th of August 2016. Please let me know if you wish to receive this letter in Afrikaans. Your e-mail received on the 17th of August 2016 refers: We hereby confirm receipt of your Interested and Affected Party Registration form and that you have been registered as an Interested and Affected Party for the Humphries Boerdery Wean-to-Finish Site Project. You will henceforth receive all correspondence regarding public participation opportunities as the process unfolds. We also take note of your comments. Please note that the draft Basic Assessment Report will be sent for public review as soon as your comments have been included and addressed in the report. Please refer to the response to your comments below: • Mitigation measures have been identified in section 8 of the Draft Basic Assessment Report to mitigate the generation of odours at the piggery. • The procedure for visiting the site is to make an appointment with the applicant by contacting the office at: 014 740 0098 or info@humphriesboerdery.co.za. Please note that you are also welcome to use the “Buurtwag” whatsapp group to communicate any concerns to the applicant. • An alternatives assessment was included in section 6 of the Basic Assessment Report. It is stated that Portion 50 of the farm Tweefontein 463 KR is the only property available for consideration. • Please note that a newspaper advertisement was placed in the Post Newspaper on the 29th of July 2016 and several notice boards were erected around the site to inform the surrounding area of the proposed project. Please refer to section 5 of the report. Please do not hesitate to contact me should you have any further questions.

Name of contact person	Company	Date	Method of comment	Issue raised	Response
Mr H.P.J. Goosen	Adjacent Landowner	22/08/2016	Email	With regard to the following feedback: *Please note that the biodigester have been designed to accommodate the increased capacity in piggery waste that will be generated at the site. The capacity of the biodigester will therefore not be increased as part of this project." I assume that the biodigester is the heart of the process that reduce the air pollution that cause bad smells. I will appreciate it if you can send me a short description and drawing of the biogas process including the biodigester. What is the biogas utilised for, heating, electricity? To satisfy me with your reply, I will appreciate technical proof that the current capacity of the biodigester include the increased capacity of the piggery waste from the project. Can you please supply me with the data sheets of the biogas system and all relevant equipment which include design data such as volumetric flow and composition of the gasses in the process. Can you provide proof that the impact of this change (project) has been evaluated with regard to the effect on all relevant equipment of the biogas system? What are the causes of the releases of vapours from the pig farm that still causes bad smells occasionally. Will this causes still be present in the future and can this project potentially magnify the impact of the bad smells? Kind regards Hennie Goosen	Dear Hennie Your e-mail received on the 22nd of August 2016 refers. Please refer to the attached response letter from Dr JA Meyer (on behalf of Humphries Boerdery (Pty) Ltd) with regards to the questions that you raised. (Response included below). Your comments, as well as the response, will be included in the subsequent reports for this project. Please do not hesitate to contact me should you have any further questions.

Response from Dr JA Meyer:

As is detailed in the sections that follow, the wastewater handling processes currently employed accord with the required legislation and stipulated guidelines.

The use of Anaerobic Digestion, in this case in the form of a Biogas Facility, and subsequent separation and solid and liquid fraction handling methods, are recommended methods for the treatment of the biodegradable industrial wastewater generated by the piggery units at Humphries Boerdery, and hold several key benefits. These include:

- The fractions contain valuable nutrients that can be used for crop and pasture production
  - An often overlooked quality is the water content of the liquid fraction, which in the water-scarce scenario recognized in South Africa, represents a valuable asset.
- Reuse in agricultural applications is advocated by the authorities and recognized to improve soil fertility, structure, health and microbial activity.
  - Within the many documented phosphorus-deficient areas in South Africa, the P-content of both solids and liquid fraction is thus also a valuable asset.
- The typical classification of the solids fraction post-composting is Unrestricted and thus available for reuse.
- The liquid fraction, when compared to inorganic fertilisers, has several benefits, including:
  - a lower atmospheric gaseous emission
  - less diffuse pollution from surface runoff
  - less leaching hazard
    - a key aspect is the preferential form of N as ammonia-N which has a lower leaching fraction and higher plant utilization coefficient than inorganic nitrate and nitrite.
  - Lower odour issues due to reduced organic matter

As a widely published guideline, the Biogas (methane) production from piggery wastewater is ca. 0.26 – 0.38 m^3CH_4/kg Volatile Solids.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

There are several options for subsequent handling of the biogas, including:
- release into air
- aeration into aerobic pond
- flaring
- heat generation using a boiler
- combined heat and power using motor generators
- compression and use as transport fuel

The current economic climate and uncertainty in terms of tariffs/rebates/incentives on renewable electricity generation hinders the feasibility of the use of the methane for the generation of electricity. This is a current reality that has hindered many confined animal feeding operations from utilizing the methane produced from covered anaerobic digesters.

Humphries Boerdery undertook a Capital and Operations Cost investigation in 2014 to install a COGEN system (heat and power) with the final conclusion being that whilst the existing capacity in the facility does exist for additional feedstock, the current volatile solids inputs are not adequate to cover the expenditure and operational costs.

The addition of the feedstock from the proposed Grower Unit may well assist in allowing the facility to become feasible for at least heat generation, and a new Capital and Operations Cost investigation will be undertaken once the additional Grower Unit is in place taking into account the existing tariffs and capital costs applicable at the time.

Successful biogas operations internationally are well described and the invariably operate with an additional source of feedstock (organic matter, typically plant residues) to enhance methanogenesis and as heated systems.

The Biogas Facility at Humphries Boerdery is an ambient system, and whilst it does have the required infrastructure to utilise the methane produced, in the absence of the required additional feedstock and feasibility aspects noted earlier, currently the biogas produced is flared. This is viewed as an environmentally preferred option to simple release as it reduces greenhouse gas emissions, and in some countries may be used to obtain Greenhouse Gas (GHG) credits.

The design of the Biogas Facility at Humphries Boerdery is intended to provide sufficient hydraulic retention time (HRT) to enable the subsequent fractions obtained to be of appropriate quality to enable the beneficial reuse thereof.

The initial design was based on the generation of sufficient methane for a COGEN application which requires a minimum methane production to permit a minimum generator running time and was thus based on the volatile solids required.

In addition, due to the costs of land works and associated digester infrastructure, the capacity also required a minimum design specification. These capacity values are detailed in the table that follows.

Humphries Boerdery Biogas Facility specifications

Digester Measurements	**Unit**	**Capacity**
Digester width (m)	60	Resultant Digester Volume
Digester length (m)	60	
Digester depth (m)	5	**18 000 m^3**
Digester Requirements*	**Unit**	
Total Volatile Solids Per Sow (kg/per day)	3.21	Required Digester Volume
Required Digester Volume per Sow for 51 day Hydraulic Retention Time	9.10	**13 085 m^3**
Current Sow Number	1438	
Digester Requirements	**Unit**	
Proposed Sow Number	1900	Required Digester Volume **17 290 m^3**
Therefore, sufficient Digester Capacity exists for the proposed sow increase for the new Grower Unit.		

*based on total wastewater generated from production system incorporating all sows and their progeny to baconer stage.

The existing digester is currently operating at ca. 70% of the capacity that exists, with the addition of the proposed Grower Unit viewed as a significant contribution towards a potentially more viable Volatile Solids feedstock rate that may assist with the margins required for the feasibility of possible use of the methane for heat and/or electricity generation.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

Sufficient capacity thus exists to accommodate the proposed additional Grower Unit and this may furthermore assist in achieving a viable system that could enable use of the methane generated for heat and/or electricity generation.

The issue raised regarding the intermittent odour detected currently refers. It should be noted that the primary advantage of employing an anaerobic digestion phase is to convert the Nitrogen present into an ammonium-fraction. This is due to the ammonium-fraction being more bioavailable for plant utilization, and also having a lower leaching fraction and thus lower potential to detrimentally impact water resources.

The alternative form, namely nitrate-N and nitrite-N, are less available for plant uptake and have a greater risk for water resource contamination as they migrate easily through soil.

The challenge in converting the N to the ammonium-fraction is that this form is more volatile and thus more detectable. This would explain why the odour is still at time detected. This must be viewed in context of the additional benefit from anaerobic digestion which reduces offensive odours (described in detail later) by having the methanogenic phase following the acidogenic phase and subsequent reduction of organic compounds. This is widely noted in the international literature and remains the preferred option.

Humphries Boerdery should take note of the time and place in which the neighbour views the odour as detected and offensive and take the following mitigation steps:

- increase the aeration of the liquid fraction lagoon
- reduce the application load near any sensitive receptor
- alter the application method from the tanker to a trailing hose
- assess any risk factors that may increase the detection of odour (e.g. prevailing wind)

It should however be noted that the ammonia form, whilst detectable, should have a lower intensity and duration, as the digester and separator process reduces the organic content and odour generating capacity of the liquid fraction.

It should also be noted that whilst the aeration of the liquid fraction is performed to reduce the degree of ammonia-related odour volatilized on application, it does incur added odour detection in the immediate vicinity of the digester. This is still preferable to the offensive odours typically noted in association with simple evaporation lagoons.

The odour detection reported will not increase with the additional Grower Unit as the Digester capacity can accommodate the additional feedstock, with the resultant ammonia generated at the same rate in the digestate produced as currently occurs.

Improved information communication by sensitive receptors may assist Humphries Boerdery to mitigate the existing issues better.

Overview

The email received contains several questions pertaining to the proposed Grower Unit and subsequent handling of the wastewater generated by the existing Anaerobic Digester (“AD”) or Biogas Facility (“BF”).

As a point of departure it should be noted that the water and wastewater activities currently engaged in, and those proposed by the new Grower Unit, are comprehensively described in existing legislation under Section 21 of the National Water Act, with a brief Regulation Summary and Process Summary provided in the following sections.

Regulation Summary

The regulations define wastewater generated by confined animal feeding operations as biodegradable industrial wastewater.

This wastewater is subject to the General Authorisation conditions as stipulated in the Government Notice 665 of 06 September 2013, including the typical options open to the operators of confined animal feeding operations, namely reuse or disposal.

The handling, reuse via irrigation and/or disposal via storage, all require that solids are removed from the wastewater with the resulting fractions generated handled in accordance with several precautionary practices and the Water Research Commission TT documents noted.

These guideline documents note that vector reduction options are required (as stipulated in the Precautionary Practice conditions in the Notice), with Anaerobic Digestion and a separator stage representing such options.

The National Water Act (Act 36 of 1998) (“NWA”) recognizes that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all water users, and that protecting water resource quality is necessary to ensure this sustainability.

Water use defined in the NWA includes “controlled activities” which relate to the potential to impact detrimentally on a water resource.

Schedule 1 (a) to (f) refers to the Permissible Use of Water which excludes commercial uses, notably referring under (b) (iii) to “excluding feedlots”.

The use of the term “confined animal feeding operations” is preferred to the term “feedlots”, which may be incorrectly viewed as only referring to a few types of animal husbandry systems.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

The inclusion of “confined animal feeding operations” appears in the recent Government Notice to the NWA and is similar to the “concentrated animal feeding operation” and “animal feeding operation” terms used in the US EPA, in which such operations are viewed as potential point sources of pollutants which may impact water resources and are thus accordingly regulated.

Section 21 of the NWA refers under 21 (e) to “engaging in a controlled activity identified as such in section 37 (1) or declared under section 38 (1), and under 21 (g) to “disposing of waste in a manner that may detrimentally impact on a water resource.”

Section 37 (1) identifies Controlled Activities as (a)”irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterwork” and (e) “an activity which has been declared as such under section 38.”

Section 38 notes in 38 (1) that “The Minister may, by notice in the Gazette, in general or specifically, declare an activity to be a controlled activity.”

Part 6 of the NWA refers to General Authorisations as “a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing General Authorisations in the Gazette.”

Government Notice 665 of 06 September 2013:
The Government Notice No. 36820 (No. 665 of 6 September 2013) thus refers, noted as a Revision of Section 39 of the NWA for the general authorization in Section 3 of the Schedule to Government Notice No. 368 of 26 March 2004 and the general authorisations in sections 2, 3, and 4 of the Schedule to Government Notice No. 399 of 26 March 2004.

Section 1 of the Notice relates to:

1. Engaging in a controlled activity, identified as such in Section 37(1)(a): Irrigation of any land with waste or water containing waste generated through any industrial activity or waterwork. [Section 21 (e)]
1.1 notes that “This general authorization 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.”

1.6 notes that “In this general authorization, unless the context indicates otherwise, any word or expression to which a meaning has been assigned in terms of the Act shall have that meaning, and –

“**biodegradable industrial wastewater**” means wastewater that contains predominantly organic waste arising from industrial activities and premises including –
(j) confined animal feeding operations;
“**irrigation**” means the application of wastewater to any land or property for the purpose of crop production, and includes the cultivation of pasture or any other suitable purpose;
“**primary treatment**” means treatment of wastewater by a physical process;
“**secondary treatment**” means treatment of wastewater by a biological process;

1(10)(2) notes:
“Suspended solids must be removed from any wastewater, and the resulting sludge disposed of according to the requirements of any relevant law or regulation, including the document Guidelines for the Utilisation and Disposal of Wastewater Sludge, Volumes 1 – 5, Water Research Commission Reports TT 261/06, 262/06, 349/09, 350/09 and 351/09, as amended from time to time.

Key Messages
• Water resource protection is the fundamental point of departure to ensure sustainable water use.
• Confined Animal Feeding Operations may be potential point sources of pollutants due to the manure (faeces and urine) generated and subsequent handling thereof.
• The subsequent manure and wash water or flushing water produces a wastewater defined as biodegradable industrial wastewater.
• The methods for containment, treatment, storage and subsequent disposal or reuse of biodegradable industrial wastewater are detailed in the Government Notice 665 of 06 September 2013 and several Water Research Commission Guideline documents referred to therein.
• Precautionary practice conditions are stipulated for the acceptable construction, maintenance and operational practices to ensure the consistent, effective and safe performance of the wastewater system, either for irrigation or disposal.

Process Summary
In order to contextualize the process the following brief overview is provided, highlighting the component flow from generation to handling and relevant current and proposed values applicable.

- Wastewater Handling Detail – component flow

Humphries Boerdery	
Key wastewater components	Key Variable Components
SOURCE	

Name of contact person	Company	Date	Method of comment	Issue raised	Response

Faecal matter + Urine = **Manure**
↓
Manure + Water = **Wastewater**
	• Manure [breeding v. grower site]
	• Water:
	  ○ Drinking
	  ○ Wash water Flushing water
	  ○ Cooling water
	  ○ Wastage

PATHWAY	
Composition **Housing**→	• Slatted floors • Pull-plug system • Coarse screen/grid • Residence period on-site • Dilution and Release Frequency
Composition **Treatment**→	• Partial on-site AD (platforms under slats) • Closed AD (covered lagoon / Biogas Facility) • Separation • Settling • Aeration • Composting & Additional Storage (Liquid Fraction) • Additional (polishing / Flare)
Composition **Application**→	• Tanker – splash plate (liquid fraction) • Removal off-site (solids fraction – compost)
RECEPTOR	
Precautionary Practices→	• Refer to GN 665 Compliance Monitoring of Groundwater and Surface water

- Wastewater Handling Detail – Existing and Proposed Values

Existing Tweefontein Unit wastewater generated (L/day):	
Sow Unit Wastewater Produced	**27 805**
Grower Unit Wastewater Produced	**40 050**
Total - Existing	**67 855**
Proposed Additional Grower Unit*	**12 015**
Total - Proposed	**79 870**
% contribution from Proposed Grower Unit	**17%**

* refer to calculation detail provided below

Detail for Tweefontein Second Grower Unit wastewater generation.

Livestock Category	Numbers per category**	Estimated Wastewater Production^ (L/day)
Weaners (3 weeks – to 70 days)	1 350	540
Growers (70 - 150 days)	2 400	9 600
Other: Wash water & wastage from drinkers.	3 750	1 875
Total Wastewater Produced		**12 015**

adapted from: ^ Barber (1998) * Thacker (2001) & NRC (1998).

** taken as: 5 houses x 750 per house.

Key Messages

The piggery wastewater handling methods are in accordance with the necessary legislation and stipulated guidelines. These guidelines are based on substantial local and international research which is specifically designed to be protective of the environment and public health.

Odour control is linked to the protection of water resources and vector control, with the compliance guidelines as stipulated in the GN 665 to the National Water Act (Act No 36 of 1998) specifically designed for the acceptable application of wastewater sludge to agricultural land.
It is also noteworthy that the handling, treatment, storage and subsequent disposal of wastewater generated from piggeries to agricultural land, is practiced both locally and internationally with due regard for both benefits and potential risks.

The benefits include the use of the wastewater as a valuable resource as a fertiliser and soil conditioner, resulting in lowered application rates of inorganic fertilisers (which are less available for plant uptake and more likely to pollute water resources and the environment) and improved soil structure, water retention capacity and soil water transmission.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

The potential risks include nutrient overloading, the presence of pathogens, odours and vector attraction. These are addressed collectively by the stipulated guidelines prescribing:

- Nutrient Loading Rates
- Vector Reduction Methods
- Restrictions and Requirements for Agricultural Use

These are all addressed in the required NWA Section 21 activity guidelines and limits which allow for permissible utilization of sludge in agricultural applications.

Specific detail is provided in the General Authorisations relating to sub-section 21(e) and 21(g) of the NWA and technical guidelines prescribed therein.

The existing AD, separation stage, and subsequent fraction handling form part of the primary and secondary treatment process recommended by the prescribed guidelines.

The proposed expansions will represent an additional 17 % feedstock input to the existing AD.

Anaerobic Digester and Odour background

Background to Odour and Environmental concerns

Wastewater generated by the piggeries contains organic matter that may include over 80 volatile compounds (e.g. iso-butonic acid, butonic acid, iso-valeric acid and valeric acid) and may be responsible for the production of unpleasant odours, but these can be significantly reduced if managed appropriately.

Whilst odour is a complex issue, both in terms of measurement and wind-dispersion modeling, it is noted in the literature that:

- Intensity decreases with distance.
  - Studies cited in the literature dealing specifically with pig farming activities noted that from 480 m the trend was for zero detection of any odour.
  - In instances where from 800 m the odour was detected it was classified as “detectable, but non-offensive”.
  - The highest percentage of “offensive” classification was in the 100 – 200 m range.
  - This is mitigated by compliance to:
    - the stipulated setback limitations for applications
    - the stipulated application rates per year and per day

- Of the 168 chemicals described in animal slurry to contribute to odours, the key problematic or offensive characteristics were attributed to volatile acids and other chemicals associated with anaerobic conditions.
  - This are mitigated by:
    - the use of AD on the site platforms prior to discharge to the next treatment phase
    - the use of a separator
    - and final settling and disposal of the liquid fraction.

- Odour factors that are considered in the relevant guidelines include Intensity, Duration, Frequency and Offensiveness.
  - The setback restriction, in conjunction with the treatment methods employed and low application rate, would afford acceptable protection.

- The method of treatment and application also has to be protective of the environment, and in this regard the ammonia fraction produced by the AD stage is desirable as it provides N in a form that is more available for plant utilization. This form does volatilize more easily, hence the detection thereof at the time of application when in close proximity. The alternative N form of nitrate is not desirable, as although this has no odour impact it is far more environmentally problematic as it can migrate through soil barriers to pollute water resources, a topic that has been published extensively both locally and internationally.
  - The application of the liquid fraction (post-separator) with the treatment methods employed is detailed by the relevant guidelines to thus ensure sufficient ammonia presence for plant utilization and lower nitrates to be protective of the environment.

The use of Anaerobic Digestion to reduce odours

The slurry collection system on site allows for the use of AD to assist with odour control. The stages involved are influenced by micro-organisms required for the various steps, a summary of which is provided in Figure 1.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

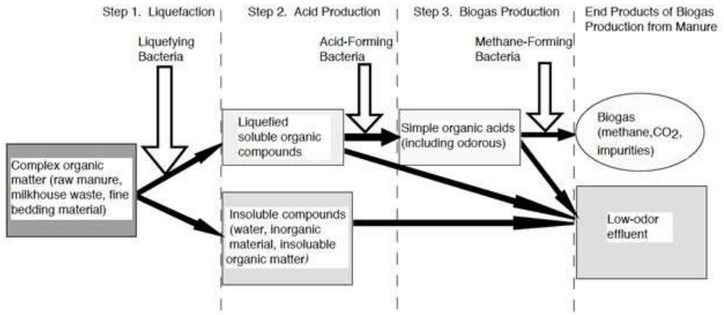


Figure 1: AD process stages (from: http://extension.psu.edu/energy/waste-to-energy/biogas/projects/g-77)

A critical benefit of this process is a lowering of pathogen numbers and thus effective at lowering the pathogen loads that could be considered to present a public health risk.

An additional benefit has also been reported with common fungal plant diseases to be irreversibly inhibited by AD. A number of factors are relevant to the AD process, but it was concluded that AD is beneficial due to significant or total destruction of many disease-spreading spores with similar observations were made regarding weed seeds.

This, in association with the stipulations contained in the Section 21 Guidelines prescribed, may allow for the disposal of the solids phase to the general public for unrestricted use.

Odour management assisted by Separator Process

Several benefits towards odour management are noted with the separator system used.

- **Separator Stage**

The collected slurry is first subjected to a combination of a Separator Phase followed by a Settling Lagoon Phase, following which the overflow is collected for application to agricultural land.

The Separator Phase uses a Sepcom Screw Press Separator with a capacity *of 65 m^3/hour.*

This represents a **significant margin of safety** as less than 80 m^3 is produced *per day*.

The separator thus operates on an intermittent basis as required and has sufficient capacity to accommodate the proposed grower unit.

As reported by Bauer *et al*. (2009) when compared to the rotary screen the screw press gave a higher separation efficiency and reliability. Burton and Turner (2003) and Frost and Gilkinson (2007) investigated different separators and reported the following results:

		Separator Efficiency*				
		DM	N	P	K	Volume Reduction (%)
Brushed Screen (pig slurry)	19	6	7	5	5	
Sieve Drum	20-62	10-25	10-26	17	10-25	
Screw Press	**20-65**	**5-28**	**7-33**	**5-18**	**5-25**	
Median Screw Press (*as a % of input partitioned to Solid Fraction)						

	Median Screw Press Values^			
	N	P	K	Volume Reduction (%)
Screw Press	**20**	**11.5**	**15**	

^Frost and Gilkinson (2007).

Note that the range achievable at Humphries Boerdery may be at the upper end due to the production system specifics (slated floors and optimal sieve selection). However, in the interests of conservative estimation, the **median values** have been used to calculate the load applied to agricultural land.

Name of contact person	Company	Date	Method of comment	Issue raised	Response

These values effectively reduce the total volume applied ultimately to agricultural land and also the N content of that applied as follows:

Separator Liquid Fraction wastewater sludge composition

Reductions from Typical Pig Slurry Composition^ with Separator Phase*			
Volume Reduction	**Kg N/1000 L**	**Kg P/1000 L (P_2O_5)**	**Kg K/1000 L (K_20)**
1000L^	4.2	1.4	2.2
1000L x 85%*	3.5	1.12	1.94
References: ^Lukehurst, C.T., Frost, P. and Al Saedi, T. (2010). Utilisation of digestate from biogas plants as biofertilizer. IEA Bioenergy. Task 37. www.IEA-Biogas.net/ * Frost and Gilkinson (2007).			

These median values are used from Frost and Gilkinson (2007) in the nutrient application calculations employed by the piggery to ensure compliance with Section 21 (e) of the NWA.

Additional benefits to Separator Stage

A significant aspect noted with the screw press separator by Bauer *et al*. (2009) was that more of the P was partitioned to the solids phase (note WRC TT Disposal Guideline and Composition sections). The subsequent removal of the solids post-composting off site is viewed as a means to lower the hectares required for the disposal of the liquid fraction to agricultural land and to also lower the potential adverse eutrophication impact.

In addition the N utilization by crops following the application of the liquid fraction from AD was increased when compared to just pig slurry (Birkmose, 2009). Values cited were:

	NH_4-N % of Total N	N utilisation (% of Total N)
Pig slurry	74	63
Liquid Fraction	82	78

It should be noted that the issue relates to the form of the N with the total amount similar between feedstock and digestate (Lukehurst *et al*. 2010). The benefit from AD is the conversion of the N to the ammonium form with a subsequent increase in utilization by plants. As was noted by Lukehurst *et al.,* (2010) the same quantity of ammonium-N in mineral fertilizer and digestate should technically have the same benefit, but due to an increased volatilization component of digestate, a lower utilization is expected, hence the focus in many countries on best practice methods to reduce the exposure of digestate to air.

A benefit of incorporating a Separator stage is that a more liquid fraction is considered to **enter the soil more efficiently, resulting in lower odour problems following land application.**

Additionally, the storage of separated liquid in dams should have a lower potential to produce persistent odour problems as more of the substrate (solid fraction) has been removed.

Since the liquid fraction should contain no solids/fibre, thus less crust should form (crusts contribute to anaerobic conditions and further putrification of liquid and consequently odour issues).

Summary

In summary, the following aspects allow for odours to be managed appropriately:

- Site construction:
  - All wastewater contained and collected in cement lined canals.
- Wastewater treatment:
  - Collection, storage, AD, Separation and subsequent handling methods, will all result in less anaerobic-related volatile acid and offensive odour production.
- Wastewater application to agricultural land:
  - The applicable hectares as required by the DWS for the application of wastewater to agricultural land for the proposed activities will be adhered to.
  - This includes prescribed buffer zones.
- High production and Biosecurity standards:
  - In order for the activity to be economically viable, given the current input cost realities of pig production systems, within the perspective of the investment capital required for the proposed expansion, an underlying foundation of strict biosecurity measures and a disease-free herd is required.
  - This is in addition to securing one of the most valuable inputs, namely water quantity and quality.
  - In order to establish and maintain this, all wastewater handling practices must be of such a standard to ensure environmental sustainability.

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				Considering the adherence to strict biosecurity measures, waste handling methods and low rate of application thereof, the quality, frequency and volume of application should not result in unacceptable odours.	
				Answers to the additional questions received are best dealt with by referring the query to the substantial international literature on the application of Biogas Facilities for piggeries, as the process employed at Humphries Boerdery does not represent a new approach and is described in great detail in these publications. Additionally, it must be considered that some of the specific designs aspects have an associated intellectual property right between the provider and client. **Recommended Reference Material** http://www.greengasgrids.eu/ http://www.iea-biogas.net/files/daten-redaktion/download/publi-task37/Digestate_Brochure_Revised_12-2010.pdf http://www.defra.gov.uk http://www.omafra.gov.on.ca http://www.iea-biogas.net/ http://www.epa.gov/agstar/documents/2010_digester_update.pdf http://www.biocycle.net/2012/02/farm-digester-industry-in-america/ http://www.biofuelsassociation.com.au/biofuels/biogas Al Seadi, T. et al. (2009). Biogas Handbook. ISBN 978-87-992962-0-0. Wellinger, A. (2009). Anaerobic Digestion – An Overview. http://www.iea-biogas.net/ Wellinger, A. (2007). Basic data on biogas, Swedish Gas Centre. http://www.iea-biogas.net/ Bioexell (2005). Biogas: BIOEXELL Training Manual on Anaerobic Digestion: http://web.sdu.dk/bio. Bioexell/Down/Bioexell_manual.pdf: http://europa.eu/legislation_summaries/food_safety/specific_themes/f81001_en.htm Immovilli, A., Fabbri, C. and Valli, L. (2008). Odour and ammonia emissions from cattle slurry treated with anaerobic digestion. CRPA Italy. https://www.environment.gov.au/system/files/pages/c7dc0bcb-56b7-41c0-9c66-69618c7dcad7/files/cfi-national-environmental-guidelines-piggeries.pdf	
Belinda Malatji	Department of Co-operative Governance, Human Settlements & Traditional Affairs	30/08/2016	Email	RE: NOTICE OF DRAFT BAR AVAILABLE FOR REVIEW: HUMPHRIES BOERDERY WEAN-TO-FINISH SITE (SMS REF: HUM-BEL-15-09-29) 1. The above matter refers. 2. The Department acknowledges receipt of your communique regarding the Notice of Draft Basic Assessment Report: Humphries Boerdery Wean-to-Finish Site (SMS Ref: HUM-BEL-15-09-29). 3. It is of importance that the physical features be noted and not be affected by your proposed submission. Therefore, any exploration methods (Drilling, Soil Sampling and Ground Gravity Survey and etc.) must be conducted in a manner that will not have a negative impact on the Environment. 4. Should the application be successful, it is deemed necessary that the following recommendations be adhered to: 4.1 Pollution management and safety of the community against the activities. 4.2 Rare species must be preserved. 4.3 Rehabilitation must be properly done and ensure that original land use of the land is restored. 5. All comments and recommendation of other statutory bodies should also be taken into consideration.	RESPONSE TO COMMENTS RECEIVED: PROPOSED HUMPHRIES BOERDERY WEAN-TO-FINISH SITE PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR Dear Ms Malathi Your e-mail received on the 30th of August 2016 refers. Please herewith find our response to your comments. 1. No exploration methods have been conducted as part of this project. If any exploration methods will be conducted in the future, it will be ensured that it will be conducted in a manner that will not negatively affect the environment. 2. Mitigation measures for impacts identified have been included under Section 8 of the Basic Assessment Report. Please note that these mitigation measures have also been included in the Environmental Management Programme (Section 5) which will be implemented at the Humphries Wean-to-Finish Site should the application be successful. Mitigation measures include pollution management, the protection of rare species and rehabilitation of the construction area. 3. All comments received from other statutory bodies have been included in the Draft Basic Assessment Report (Section 5). Any further comments will also be included and addressed in the subsequent reports for this project. Please do not hesitate to contact me should you have any further questions.
Mr Moletjie	Department	14/09/2016	Email	COMMENTS ON PROPOSED HUMPHRIES BOERDERY WEAN-TO-FINISH SITE	**RESPONSE TO COMMENTS RECEIVED: PROPOSED HUMPHRIES BOERDERY WEAN-TO-FINISH**

Name of contact person	Company	Date	Method of comment	Issue raised	Response
Mahlakoane	of Agriculture Forestry & Fisheries: Directorate: Land Use & Soil Management			PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR The above matter bears reference to DAFF: LUSM site visit on 19 august 2016 and the study to the available specialist reports. The Department of Agriculture, Forestry and Fisheries: hereby confirms that the facility as mentioned above was inspected on 19 August 2016. During the inspection and the discussion/briefings by the owner (Humphries) and the consultant (Shangoni) to DAFF and LDARD, it was noticed that the proposed establishment is an extension to the long existing Piggery farming. The proposed establishment is in line with the DAFFs mandate of food security and agri-business. The impacts to vegetation and soil is very minimal because the structures will be erected on previously disturbed unused piece of land and that the soil will not be contaminated be “sewage” from the Piggery because there is state of art solid digester that handles the solids to near-dry compost-suitable-matter. There are similar farming establishments (poultry farms) within the bird’s eye vicinity. Department of Agriculture, Forestry and Fisheries does not record any degradation of natural resources attached to the establishment and therefore Recommend the approval of the proposed above-mentioned establishment. Further to the above inspection it was also observed that the farm is infested with alien invasive plants as per Reg. 15 of the Conservation of Agriculture Resources Act, Act 43 of 1983. The Landuser is therefore urged to do a walkabout through the whole farm to identify and bring under control such plants as stipulated in the Dimela Consulting Specialist Report.	**SITE PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR** Your e-mail received on the 14th of September 2016 refers. Please herewith find our response to your comments. We take note of your comments and the fact that you have no objections with regards to the proposed development. The eradication of alien invasive species has been included under Section 8.4.1.6 of the Draft Basic Assessment Report and Section 5.1.6 of the Environmental Management Programme (EMP) compiled as part of this project. Please do not hesitate to contact me should you have any further questions.
Mr H.P.J. Goosen	Adjacent Landowner	15/09/2016	Email	Hi Karien Hope I’m not too late with my comments on the draft. How will Humphries Boerdery ensure that the required mitigation measures is implemented before the project is signed off? Who will verifies that the mitigation measures are implemented? How will Humphries Boerdery Environmental Programme (EMP) be checked for compliance? (Third party). In other words, what assurance do we as adjacent landowners have that this programme is in place to manage the identified impacts and that this is not just a paper exercise to please the legislator?	**RE: EIA HUMPHRIES BOERDERY WEAN-TO-FINISH SITE (SMS REF: HUM-BEL-15-09-29) AND NOTICE OF DRAFT BAR AVAILABLE FOR REVIEW: HUMPHRIES BOERDERY WEAN-TO-FINISH SITE (SMS REF: HUM-BEL-15-09-29)** The e-mails as referred to above, received on the 15th of September 2016, holds relevance. Please find herewith our response in accordance to your comments. Note that the comments and responses will be included in the subsequent reports for this project. *Point 1:* *How will Humphries Boerdery ensure that the required mitigation measures are implemented before the project is signed off? Who will verify that the mitigation measures are implemented?* Response: Please note that the project may not commence before Environmental Authorisation is obtained. Should Environmental Authorisation be granted for this project, the Environmental Authorisation and Environmental Management Programme will become legally binding documents. Humphries Boerdery will be required to

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				Just a recommendation: Referring to *Table 33: Environmental Impact Assessment* - distinguish between existing mitigation measures and new measures to be implemented. Assign a responsible person and target date for implementation to each new measure identified. New measures to reduce the risk is compulsory and must be indicated as “shall be” or “must be” and not as “can be”. Nice to have’s should not be included in this table. Kind regards Hennie (HPJ) Goosen	comply to the conditions of the Environmental Authorisation and Environmental Management Programme and audit reports should be submitted to the Competent Authority at timeframes as specified in the Environmental Authorisation. *Point 2:* *Just a recommendation:* *Referring to Table 33: Environmental Impact Assessment - distinguish between existing mitigation measures and new measures to be implemented. Assign a responsible person and target date for implementation to each new measure identified. New measures to reduce the risk is compulsory and must be indicated as “shall be” or “must be” and not as “can be”. Nice to have’s should not be included in this table.* Response: Your recommendation is noted. Should Environmental Authorisation be granted for this project all mitigation measures and conditions as stipulated in the will be Environmental Authorisation and Environmental Management Programme will become legally binding documents. *Point 3:* *Does flaring of biogas in this context meant biogas is burned and then released or is it directly released to atmosphere without being burnt?* Response: Flaring of biogas in this context means that the biogas is burned before it is released. *Point 4:* *Methane is also classified as a major green house gas, however when utilising methane as an energy source to generate electricity or for example as a heating source it has a less environmental damaging effect than burning coal or other fossil fuels for these purposes. This is the reason why green house credits is awarded in certain countries when methane is utilised as energy source. This imply that the increased release of methane gas produced must also be accounted for and assessed during this study.* Response: As discussed in the response from Dr J.A. Meyer, dated 29 August 2016, the increased production of methane as a result of this project, will assist in allowing the facility to become feasible for the use of methane as an alternative energy source. A new Capital and Operations Cost investigation will be undertaken once the additional Grower Unit is in place. For the time being, the biogas produced will also be flared as per current operational procedures. *Point 5:* *Is there any levels of hydrogen sulphide present in the biogas that is released to atmosphere? If yes, will the mass of hydrogen sulphide released to atmosphere increased? (The physical properties of hydrogen sulphide is that it creates bad smells – rotten egg – at very low concentration levels – less than 5 ppm). The smell we as neighbours currently experience is definitely not ammonia vapours.* Response: Hydrogen sulphide (H_2S) is noted as one of the **trace** inorganic gases produced during the anaerobic digestion process.
Mr H.P.J. Goosen	Adjacent Landowner	15/09/2016	Email	Good day Karien First of all compliments for the completeness and extend of the feedback covered in this document. The effort is appreciated and I believe it will contribute to the quality of the environmental assessment report to be released. Please allow me just a few more questions and a suggestion to finalise this subject. Does flaring of biogas in this context meant biogas is burned and then released or is it directly released to atmosphere without being burnt? Methane is also classified as a major green house gas, however when utilising methane as an energy source to generate electricity or for example as a heating source it has a less environmental damaging effect than burning coal or other fossil fuels for these purposes. This is the reason why green house credits is awarded in certain countries when methane is utilised as energy source. This imply that the increased release of methane gas produced must also be accounted for and assessed during this study. Is there any levels of hydrogen sulphide present in the biogas that is released to atmosphere. If yes, will the mass of hydrogen sulphide released to atmosphere increased? (The physical properties of hydrogen sulphide is that it create bad smells – rotten egg – at very low concentration levels – less than 5 ppm). The smell we as neighbours currently experience is definitely not ammonia vapours. It is stated that the digester is currently operated at 70% of its capacity. Does that include all auxiliary equipment/systems as the specifications supplied only refers to the volume of the digester and the capacity of the screw press separator. Without providing any design data that can be classified as intellectual property, can it be confirmed that all auxiliary equipment/systems for the waste water handling system are designed for the increased capacities? I would like to see that an effective reporting and investigation process is implemented to determine the direct and root causes when offense odours is released and to identify appropriate corrective actions. These information needs to be communicated in time to the complainant. (Involved	

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				parties is welcome to consult me in this regard as I have extensive knowledge and experience in this field). Kind regards Hennie Goosen	a. As an example of the contribution thereof the following is cited in the biogas literature: i. Methane = 50 – 60% ii. CO2 = 38 – 48% iii. Trace components = 2% 1. Includes: H, H_2S, Non-methane VOC. b. The typical % of H2S in the biogas is only 0.15%. Two types of problems are typically encountered in which H_2S can be problematic: a. High Sulphur content of the feedstock: i. This is noted with feedstock used from the Poultry sector, e.g. broiler manure. 1. Kg/ton Broiler manure = 3.3 ii. This is not noted with piggery wastewater as the S content is significantly lower. 1. Kg/ton piggery wastewater = 0.4 b. High Sulphur content of water: i. This has been noted in some cases where background water Sulphate is naturally very high (>500 mg/l). ii. This <u>does not apply</u> to the Humphries Facility as the water source utilised has a very low Suphate content of between 2 – 6 ppm (mg/l). The consequence of the high H_2S is not specifically attributed to any odour issue but rather to the corrosive nature of the H_2S on piping infrastructure when the methane is processed further. a. This is why no specific limits are placed on H_2S produced by biogas facilities as it is not a major component thereof. b. There is much available in the literature on methods to reduce the H2S, but at the current juncture the biogas generated is flared, so the H2S is not an issue. c. Should the Humphries Biogas Facility be used to generate heat&/power, H2S lowering technology will be included in the additional infrastructure in the interests of protecting the piping infrastructure. <u>*Point 6:*</u> *It is stated that the digester is currently operated at 70% of its capacity. Does that include all auxiliary equipment/systems as the specifications supplied only refers to the volume of the digester and the capacity of the screw press separator. Without providing any design data that can be classified as intellectual property, can it be confirmed that all auxiliary equipment/systems for the waste water handling system are designed for the increased capacities?* <u>Response:</u> The capacity of the biodigester referred to in previous correspondence also refers to all related auxiliary infrastructure. Infrastructure associated with the biodigester was designed and installed in conjunction with the biodigester and with the sufficient capacity as per specifications already provided. <u>*Point 7:*</u> *I would like to see that an effective reporting and investigation process is implemented to determine the direct and root causes when offense odours is released and to identify appropriate corrective actions. These*

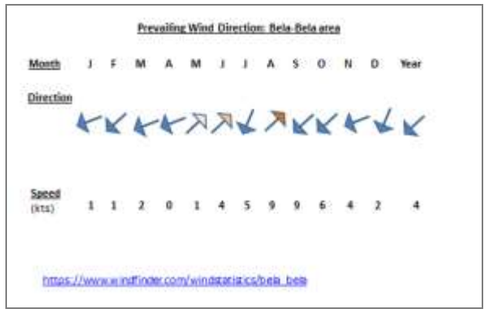
Name of contact person	Company	Date	Method of comment	Issue raised	Response
					information needs to be communicated in time to the complainant. (Involved parties is welcome to consult me in this regard as I have extensive knowledge and experience in this field). Response: Humphries Boerdery has implemented proactive management of the existing piggery to ensure that the piggery and associated processes run effectively and sustainably. This process will be continued as part of the proposed development. Inspections and auditing for current and future operations will ensure that the farming operations comply with the relevant rules and regulations as stated above (see also our response in point 1 above). Please do not hesitate to contact me should you require any further information or clarification on the responses above.
Johannes Maree / Jane Linga-Longa	Linga-Longa	22/09/2016	Email	**Humphries Boerdery Wean-to-Finish Site** Below are the comments from Linga-Longa 1. Please note that these comments must form part of the comments and feedback from I&APs and must be included in the EIA report. As well as the documents that are submitted to LEDET and any other governing authority. 2. We would like to know if the EIA report is also going to be submitted to the Dept. of Water & Sanitation (DWS), as there are important aspects that they need to be made aware of and be able to comment on? 3. It is our opinion and understanding that the project will require a Water Use Licence Application (WULA). Has one been compiled? If so could we please obtain a copy. 4. Linga-Longa's concern is first and foremost that the proper process does not seem to have been fully followed. Although we received a letter (dated: 28 July 2016), we were not further informed as to public meetings regarding this matter. Are we incorrect and public meetings are still to follow? If public meetings were held could we please see an attendance register. Without these it would be fair to surmise that the process as not be fair and transparent. 5. There is already an existing piggery on the property. How does this existing operation form part of the proposed project? Where are the EIA reports and specialist reports for this existing operation that is already up and running? Where is the Environmental Authorisation (EA) from the relevant authorities? 6. The specialist vegetation report by Dimela Eco Consulting (2016) is fairly comprehensive in terms of the floral component, but fails to address the real impacts on the environment of the project as a whole, except superficially and generically. 7. According to the Vegetation Report the removal of indigenous vegetation is a major disturbance event (See Section 5.1). Furthermore, that the project can and will cause the spread and establishment of invasive weeds (See Section 5.1). This raises two pertinent questions. Namely, a. What about protected trees? There are a number of protected tree and	**RESPONSE TO COMMENTS RECEIVED: PROPOSED HUMPHRIES BOERDERY WEAN-TO-FINISH SITE PROJECT ON PORTION 50 OF THE FARM TWEEFONTEIN 463 KR** Your letter received on the 22nd of September 2016 refers. Please herewith find our response to your comments. *Point 1:* *Please note that these comments must form part of the comments and feedback from I&APs and must be included in the EIA report. As well as the documents that are submitted to LEDET and any other governing authority.* Response: Your comments are herewith acknowledged and will be included in the subsequent reports to be submitted to the Limpopo Department of Economic Development, Environment and Tourism. *Point 2:* *We would like to know if the EIA report is also going to be submitted to the Dept. of Water & Sanitation (DWS), as there are important aspects that they need to be made aware of and be able to comment on?* Response: The Department of Water and Sanitation has been notified of the project and the draft Basic Assessment Report have been submitted to them. Please refer to Appendix 1.1 and 1.2 for the relevant correspondence. *Point 3:* *It is our opinion and understanding that the project will require a Water Use Licence Application (WULA). Has one been compiled? If so could we please obtain a copy.* Response: A water use licence for the Humphries Boerdery Piggery was granted by the Department of Water Affairs on the 08/08/2007 with the following reference number: 27039829. The following response was provided by Dr James Meyer, the water specialist involved in the Humphries Boerdery Piggery for existing and proposed projects: "The initial assessment for the Draft Basic Assessment Report indicated that the additional biodegradable

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				herbaceous species in the area. Have these been properly identified? Has a tree permit been obtained? b. Regarding invasive weeds. Has a proper Weed Eradication and Control Programme been compiled? If so, could we please get a copy to peruse and give comment on? 8. The two potential sites investigated are both within Ecological Support Areas (According to the vegetation report). Therefore, should the client and specialists not investigate alternative sites that are less sensitive? 9. Has an Environmental Management Plan (EMP) been compiled? If so could we please see it. Also please make sure that the EMP is project and site specific and not those typical generic ones that people often try to get away with. 10. A piggery creates vast amounts of swill and highly polluted water. Legislation demands that a proper Stormwater Management Plan and general water and effluent management plans are compiled and implemented. Have any of these been drawn up? If so, could we please see copies of these reports and plans. 11. The existing piggery does not appear to be well managed along proper and existing regulations. This is evident due to the fact that extremely unpleasant and excessive smells (stink, odours) continually are smelt at Linga-Longa that come from the present, small set-up. The smell is so bad, it smells like raw, flowing sewage. Linga-Longa's objection to the present, small setup is that these awful, unpleasant and 'illegal' smells are negatively affecting our business. Linga-Longa runs an accommodation site and many first-time clients are complaining about the awful smell and we are losing business directly as a result of the pig farm. Now, the proposal is to expand. If present poor management is anything to go by, this will make matters much worse and even more unbearable. This is unacceptable. 12. Linga-Longa's concern is that the swill and watery effluent produced at the existing operation is potentially contaminating the areas ground water. We have a number of boreholes that are used for drinking and cooking. The Eerstbewoon area (in which the proposed project and Linga-Longa are situated) has very deep, sandy soils. Effluent, toxins and disease from the piggery, which is not properly managed, creates a massive threat to easily getting into our underground water. Furthermore, all the households and farms in the immediate vicinity rely on underground water for drinking. On these grounds we strongly object, not only to the proposed expansion, but even to the present pig farm operation. 13. There are continually excessive amounts of flies in our area, houses, kitchens, etc. (except maybe for a few weeks in mid winter when it is cold). We are convinced that the main source of the plague of flies is from the existing piggery. The main reason for this is properly due to the poor management of the site. Just imagine what a fly plague we will have if the piggery is expanded. On these unacceptable grounds Linga-Longa objects to the proposed project. It is the opinion of Linga-Longa that the existing and proposed piggery projects are	industrial wastewater generated by the proposed Humphries Boerdery Wean-to-Finish Site will represent an increase of ca. 17% over that currently produced. The current Section 21 activities (abstraction, irrigation with wastewater and storage of wastewater) conducted are compliant with the relevant legislation, specifically the GN 665 of 06 September 2013 and applicable guidelines. It should be noted that the irrigation with biodegradable industrial wastewater from the confined animal feeding operations (existing grower unit 1 and sow facility) is permissible as part of a General Authorisation (as prescribed by the GN 665 of 06 September 2013) and does not require a licence. The existing water and wastewater monitoring reports have demonstrated that the abstraction rates are within the recharge rates required with no alteration in the inherent stochasticity of the water chemistry, and that no impact from the current wastewater handling practices was evident, indicating that the practices are compliant and sufficiently protective of the water resources involved. The existing wastewater handling infrastructure, namely an Anaerobic Digester and Separation Stage (producing a liquid fraction and a solid fraction), has sufficient capacity to accommodate the additional wastewater load from the proposed Humphries Boerdery Wean-to-Finish Site (refer to Appendix 2.1). A Water and Wastewater Position Statement will be compiled as part of the application for registration of the activities to the Department of Water and Sanitation, in which compliance to the relevant guidelines will be detailed. A geohydrological study is also typically conducted to demonstrate sufficient water resource protection and sustainable recharge rates for the abstraction volumes required. Should the authorities (Limpopo Department Economic Development, Environment and Tourism) issue an Environmental Authorisation for the proposed expansion, such Authorisation will include a condition requiring compliance with relevant legislation applicable, including that for the National Water Act (competent authority Department of Water and Sanitation)". *Point 4:* *Linga-Longa's concern is first and foremost that the proper process does not seem to have been fully followed. Although we received a letter (dated: 28 July 2016), we were not further informed as to public meetings regarding this matter. Are we incorrect and public meetings are still to follow? If public meetings were held could we please see an attendance register. Without these it would be fair to surmise that the process as not be fair and transparent.* Response: The public participation process was conducted in terms of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended in Government Notice 982 of 4 December 2014, Chapter 6, Section 41. Please refer to Appendix 3 for the Public Participation Process followed. Please note that the

Name of contact person	Company	Date	Method of comment	Issue raised	Response
				flawed and do not meet the necessary legislated standards and compliances. That the required documentation, studies and processes are not been met and/or followed. On these grounds and those mentioned above we feel that the projected should not proceed. Please note that we appreciate the opportunity to voice our concerns and opinions and request that each and every objection and request above be responded to. Thank you. Johannes Maree Director: Linga-Longa Date: 22 September.	proof of public participation was included under Section 5 and Appendix E of the Basic Assessment Report for the Humphries Boerdery Wean-to-Finish site. No formal public meeting was held but I&AP's were given time to submit comments based on the information in the BAR and EMP. Please see the time frames and public process followed as described in Section 5and Appendix E of the BAR. <u>*Point 5:*</u> *There is already an existing piggery on the property. How does this existing operation form part of the proposed project? Where are the EIA reports and specialist reports for this existing operation that is already up and running? Where is the Environmental Authorisation (EA) from the relevant authorities?* <u>Response:</u> Environmental Authorisation for the existing Humphries Boerdery Piggery was granted by the Limpopo Department of Economic Development and Environmental Affairs on the 15/02/2007 with the following reference number: 16/1/18-69. The existing piggery forms part of the proposed expansion as it will, via the existing sow facility, provide the proposed Humphries Boerdery Wean-to-Finish site with the animals required. <u>*Point 6:*</u> *The specialist vegetation report by Dimela Eco Consulting (2016) is fairly comprehensive in terms of the floral component, but fails to address the real impacts on the environment of the project as a whole, except superficially and generically.* <u>Response:</u> It is unclear exactly what is implied by the terms "real impacts" or "project as a whole" - if reference could be made to specific sections of the specialist report that are alleged to be deficient, the specialist could respond accordingly. <u>*Point 7:*</u> *According to the Vegetation Report the removal of indigenous vegetation is a major disturbance event (See Section 5.1). Furthermore, that the project can and will cause the spread and establishment of invasive weeds (See Section 5.1). This raises two pertinent questions. Namely,* *a. What about protected trees? There are a number of protected tree and herbaceous species in the area. Have these been properly identified? Has a tree permit been obtained?* *b. Regarding invasive weeds. Has a proper Weed Eradication and Control Programme been compiled? If so, could we please get a copy to peruse and give comment on?* <u>Response:</u> a. Referring to Sections 3.4.3 and 3.4.4 of the Vegetation Impact Assessment Report compiled by Dimela ECO Consulting, no protected plant species were identified on either of the two alternative sites identified for the development of the Humphries Boerdery Wean-to-Finish Site. This was one of the main reasons for choosing the two specific alternative sites to prevent any disturbance of protected species. It is also stated that for the attention of the applicant that a protected plant species may not be removed without obtaining a permit from the Department of Agriculture, Forestry and Fisheries. b. The eradication of alien invasive species has been included under Section 8.4.1.6 of the Draft Basic Assessment Report and Section 5.1.6 of the Environmental Management Programme (EMP) compiled

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					as part of this project. Please note that the following was also contained under Section 5.1 of the Vegetation Impact Assessment Report (Dimela ECO Consulting, 2015): "If remedial measures and monitoring is properly employed, the vegetation that will be disturbed during construction could rehabilitate well over time, and long term impacts on vegetation and faunal habitats could thus be minimal." *Point 8:* *The two potential sites investigated are both within Ecological Support Areas (According to the vegetation report). Therefore, should the client and specialists not investigate alternative sites that are less sensitive?* Response: The entire extent of Portion 50 of the farm Tweefontein 463 KR is located within an Ecological Support Area. However, as indicated in the specialist studies and the Draft Basic Assessment Report, the preferred site of development is the least sensitive in terms of the receiving environment. *Point 9:* *Has an Environmental Management Plan (EMP) been compiled? If so could we please see it. Also please make sure that the EMP is project and site specific and not those typical generic ones that people often try to get away with.* Response: An Environmental Management Programme/Plan (EMP) was compiled and was made available for public review along with the Draft Basic Assessment Report. The document was attached under Appendix F of the report. Please refer to Appendix 4 of this letter for a copy of the EMP. Please note that the EMP is project and site specific. *Point 10:* *A piggery creates vast amounts of swill and highly polluted water. Legislation demands that a proper Stormwater Management Plan and general water and effluent management plans are compiled and implemented. Have any of these been drawn up? If so, could we please see copies of these reports and plans.* Response: The objective of a Stormwater Management Plan is to improve the clean and dirty water separation of an operation. Stormwater management is part of the construction design for current modern pig production facilities, with the wastewater contained from source (inside a building in the platform) to containment and treatment in concrete canals, lined and covered anaerobic digester, lined liquid fraction holding dam and cemented, bunded and fenced solids fraction composting area. As such, stormwater cannot come into contact with the wastewater and stormwater runoff from the site itself is catered for in the construction design. There is, therefore, no risk that clean stormwater will be able to reach dirty areas and be contaminated. Therefore, no Stormwater Management Plan was compiled as part of this project. The following response was provided by Dr James Meyer, the water specialist involved in the Humphries Boerdery Piggery for existing and proposed projects:

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					Please note that the composition of the wastewater is controlled as the animals are housed in confined platforms with the wastewater being limited to faeces and urine (manure) and wash-water. This is in contrast to Domestic wastewater which is uncontrolled and characterized by a high pollutant load – the I&AP is referred to the DWS and Water Research Commission 2015 Dialogues on Contaminants of Emerging Concern, in which personal care products and pharmaceuticals in domestic wastewater are described. The term "swill" is not applicable to the production facility at Humphries Boerdery as it typically refers to "kitchen scraps" or similar organic waste matter, to which water is added, and pigs fed. The facility at Humphries Boerdery has a High Herd Health status brought about by genetic stocking with Specific Pathogen Free gilts and compliance to strict veterinary requirements that are audited quarterly. In order to function as a profitable pork production facility specific pig rations are formulated by animal nutritionists for the various physiological production stages present. *Point 11:* *The existing piggery does not appear to be well managed along proper and existing regulations. This is evident due to the fact that extremely unpleasant and excessive smells (stink, odours) continually are smelt at Linga-Longa that come from the present, small set-up. The smell is so bad, it smells like raw, flowing sewage. Linga-Longa's objection to the present, small setup is that these awful, unpleasant and 'illegal' smells are negatively affecting our business. Linga-Longa runs an accommodation site and many first-time clients are complaining about the awful smell and we are losing business directly as a result of the pig farm. Now, the proposal is to expand. If present poor management is anything to go by, this will make matters much worse and even more unbearable. This is unacceptable.* Response: The Humphries Boerdery Piggery has been operational for more than 9 years. Continual operation of the piggery would have been unlikely without proper management. The following response was provided by Dr James Meyer, the water specialist involved in the Humphries Boerdery Piggery for existing and proposed projects: The opening comment is vague without specific issues being detailed, please provide evidence to support the allegations. The piggery is audited externally according to the requirements of the Premier Pork Producers and it should be noted that a commercial piggery that fails to be well managed and/or operate in accordance with the required legislation is highly unlikely to be a viable commercial entity. The existing piggery represents one of the most advanced wastewater handling systems in South Africa, with compliance to the existing guidelines with additional safety margins. It should be noted that the liquid fraction is not currently applied to the available land to the north of the biodigester. The prevailing wind direction is noted in Figure 1 below and would suggest that for 75% of the year the winds are in a Northerly or North-NE direction. Given the anaerobic digestion separation process, the generation of offensive odours is unlikely.

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					 *Figure 1: Prevailing Wind Direction: Bela-Bela Area* It is to be expected that an ammonia odour may be detected at the time of application, but this is temporary and the ammonia –N form is preferable to a nitrate-N form which is less utilisable by plants and more likely to migrate through soil barriers to water resources. If unacceptable odours are experienced, please feel free to contact the owners who will address the issue as part of an Incident Reporting process. This should not only permit the owners to take corrective action if required, but also to ensure that the source of the odour has been correctly identified. Please refer to Figure 2 below that suggests that there are other sources of odour (Confined Animal Feeding Operations (CAFO)) that are closer, with the buffer setback from the biodigester to receptors variable from 500m to over 1000m. A setback of 500 m is the prescribed buffer.  *Figure 2: Possible Sources of Offensive Odours (CAFO#2 and #3 = Chicken houses)* It should be noted that the additional wastewater that would be generated by the proposed grower unit 2 would assist in the functioning of the biodigester as additional feedstock would assist in stabilizing conditions within the digester. Please refer to Appendix 2.1 for additional information. *Point 12:* *Linga-Longa's concern is that the swill and watery effluent produced at the existing operation is potentially*

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					contaminating the areas ground water. We have a number of boreholes that are used for drinking and cooking. The Eerstbewoon area (in which the proposed project and Linga-Longa are situated) has very deep, sandy soils. Effluent, toxins and disease from the piggery, which is not properly managed, creates a massive threat to easily getting into our underground water. Furthermore, all the households and farms in the immediate vicinity rely on underground water for drinking. On these grounds we strongly object, not only to the proposed expansion, but even to the present pig farm operation. Response: Humphries Boerdery has implemented a monitoring programme to assess the influence of the irrigation of treated wastewater on the groundwater of the area. No areas of concern have been noted. The following response was provided by Dr James Meyer, the water specialist involved in the Humphries Boerdery Piggery for existing and proposed projects: As previously noted, the reference to "swill" is incorrect and not applicable. The biodegradable industrial wastewater represents a nutrient rich controlled wastewater which is recognized as a beneficial additive to agricultural land. The current wastewater application to land via irrigation is within the required conditions of the general authorization required for the relevant Section 21 activity with an additional 15% safety margin, and the monitoring reports over several years do not provide any evidence to support the allegation of pollution made. The monitoring results of the groundwater resources provide evidence that the resources are sufficiently protected, with no evidence of any non-point source pollutant impact observed. Please refer to the prescribed legislation in which the conditions and guidelines for the irrigation of land with biodegradable industrial wastewater are specifically set to ensure adequate protection of water resources. Protection is thus achieved by compliance thereto and validated by monitoring of water resources and the wastewater fractions produced, which is demonstrated at Humphries Boerdery currently. We hereby request you to provide evidence to support the allegations made, which would include, inter alia, monitoring data from own resources and detail concerning the handling of domestic wastewater generated. Please also refer to the following: The application of the biodegradable industrial wastewater from confined animal feeding operations to agricultural land occurs as a standard practice in accordance with the principles of wastewater reuse where possible as guided by the GN 665 of 06 September 2013. It is relevant to note that such activities are not only comprehensively dealt with by the NWA and relevant Government Notices, but advocated by the **Minister of Water Affairs** in this Volume 2 guideline documentation as: "…specifically developed to encourage the responsible use of wastewater sludge in agricultural practices. The agricultural use of sludge is defined as the beneficial use….to benefit either the soil condition and/or enhance crop production in a sustainable manner. The potential benefits of the nutrients (nitrogen, phosphorus and potassium) and the high organic carbon content of sludge have been well demonstrated

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					and have led to the utilization of sludge for agricultural practices in many countries. The agricultural use of sludge is seen as an appropriate cost effective management option for South Africa both for the agricultural and wastewater industry. Sludge can also assist in increasing the organic content of soil. Generally, cultivated soils in South Africa are low in organic matter due to its rapid decomposition in our climate. This improvement of the physical properties of soil (water holding capacity, permeability etc.) as a result of an increase in organic carbon plays an important role in promoting the agricultural application of wastewater sludge in South Africa." (WRC, TT 262/06). ***The application of wastewater to agricultural land is thus the recommended option in accordance with the advocated principles of reuse where possible and recognized beneficial effects applicable.*** The inclusion of a separator stage is also recommended as per the Precautionary Practices conditions stipulated in the GN 665 of 06 September 2013 (solids must be removed from wastewater). This also results in a better liquid fraction quality with associated benefits for the application thereof to agricultural land. In addition, the solids fraction may be composted and used as an organic soil amendment with unrestricted classification (as per international and WRC TT 262/06 guidelines). **The Minister also notes that** "Subsistence and small-scale farmers can particularly benefit from the agricultural use of sludge, since the famer will benefit financially due to savings on commercial inorganic fertilisers." *Point 13:* *There are continually excessive amounts of flies in our area, houses, kitchens, etc. (except maybe for a few weeks in mid winter when it is cold). We are convinced that the main source of the plague of flies is from the existing piggery. The main reason for this is properly due to the poor management of the site. Just imagine what a fly plague we will have if the piggery is expanded. On these unacceptable grounds Linga-Longa objects to the proposed project.* Response: Figure 2 above suggests that there are other potential sources of flies. Flies are generally regarded as being predominantly found within 1.5 km of their breeding ground. The potential sources at Humphries Boedery are located further than this. The breeding ground requires manure (or decaying organic matter) that is wet or moist. It should be noted that the wastewater, in its post-biodigester stage, is subjected to a separation stage which produces a solids fraction that is predominantly dry, composted and removed off-site. The liquid fraction is temporarily held in a facultative pond with weekly application thereof to land with a high infiltration rate (due to the removal of the suspended solids) and thus also unlikely to be the source of an unacceptable amount of flies. The effective management of flies at the primary potential sources, namely the sow and grower units, is achieved by management of the potential breeding sites themselves by the capturing of the manure in a cement sump beneath slatted floors, with the platform routinely washed and the resultant wastewater thus

Name of contact person	Company	Date	Method of comment	Issue raised	Response
					subjected to a predominantly anaerobic stage. Additional fly-bait traps are also used. It should also be noted that it is unreasonable to expect that house flies can be eliminated from an agricultural setting. We trust that you will find the above in order. Please do not hesitate to contact me should you have any further questions.

5.3.8 Conclusions of the PPP

In conclusion, the Public Participation exercise has provided adequate information to enable an understanding of what the proposed Humphries Boerdery Wean-to-Finish Site activities would entail and to address the concerns and comments received during the BA process.

6. IDENTIFIED ALTERNATIVES

The following definition of “alternatives” is given in the 2014 EIA Regulations:
"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the-
(a) property on which or location where the activity is proposed to be undertaken;
(b) type of activity to be undertaken;
(c) design or layout of the activity;
(d) technology to be used in the activity; or
(e) operational aspects of the activity;
and includes the option of not implementing the activity;

Typically, alternative assessments are conducted to assist in comparing various projects or attributes of projects that will occur. The most critical comparison is evaluating any proposed project against the No-Go option. The alternatives assessment then considers alternatives to project site selection for the proposed development; alternatives to layout of the development; and alternatives to construction methodologies and/or materials used for the development.

6.1 No-go option

The alternatives assessment was conducted using a simple cost-benefit analysis of each proposed alternative, through assessing various environmental attributes. These attributes can include physical (geology and soils, surface water quality and quantity, groundwater quality and quantity); biophysical (fauna and flora, sensitive environments); and social attributes (site of archaeological or cultural importance, land use issues, social health and welfare).

The impact of each alternative was then evaluated in terms of whether it has a positive, negative, or no impact. In this instance, the impact is not evaluated in terms of significance but rather whether or not it will arise. Positive impacts are assigned a value of 1; no impact a value of 0; and a negative impact a value of -1.

By adding all of the attribute scores for each alternative, a suitability score is derived that indicates the preferred alternative. A total positive score indicates the project benefits outweigh the potential negative impacts, while a total negative score indicates the project environmental costs outweigh the potential benefits. Essentially, the highest scoring alternative is then carried forward for full impact evaluation.

The potential impact of the preferred project option on environmental and socio-economic attributes identified during the assessment phase is evaluated against the potential impact of the No-Go option on the same attributes. The summary of this assessment is provided in Table 28 below.

Table 28: Development vs. No-Go option

Attribute	Development Option	No-go Option
Physical environment		
Air Pollution	0	0
Noise Pollution	-1	0
Water Quality	0	0
Water Quantity	-1	0
Visual Aesthetics	0	0
Biophysical environment		
Fauna	0	0
Flora	-1	0
Sensitive Environments	0	0
Social environment		
Traffic	-1	0
Impact on property values	1	0
Safety and security	1	0
National and regional economy	1	0
Infrastructure development	1	0
Food Security	1	0
Total	**1**	**0**

From the information presented in the table above it can be seen that the development option (piggery establishment) is preferred to the No-go option, as derived from comparative analysis.

The development option has an overall score of 1. This results from the negative impacts of the piggery, including mitigatable impacts on flora, traffic and water quantities being exceeded by its positive impacts, including a positive impact on property values, food safety, the national and regional economy and the development of infrastructure.

6.2 Alternatives considered

The following alternatives were compared using a qualitative assessment.

6.2.1 Activity alternatives

The activity is the development (construction and operation) of a wean-to-finish unit. As this is the type of development the applicant wishes to establish, no activity alternatives could be considered.

6.2.2 Location alternatives

Only Portion 50 of the farm Tweefontein 463 KR was considered for the establishment of the piggery as it is the only property available for consideration.

6.2.3 Site layout alternatives

The ideal location for the construction of a piggery is on an area which is relatively flat. This minimises the earthworks required for platform preparation. It is also beneficial for the piggery houses to be slightly elevated above the wastewater collection system.

Two potential site alternatives have been identified for the establishment of the new wean-to-finish unit as shown in Figure 2.

Site Alternative 1 (Preferred Alternative)

Site alternative 1 is located on the eastern border of the project property and is the preferred option for the development of the wean-to-finish unit. The site is located within secondary bushveld on an area that was historically transformed by agricultural activities such as cultivation and grazing and vegetation consisted of a high frequency of pioneer species. The vegetation on site has been significantly altered and is of low sensitivity. Due to the transformed nature of the vegetation, it is also unlikely that the development will have a significant impact on the fauna present on the site. The site is also located more than 500 from the wetland present on site. No sites, features or artifacts of cultural heritage (archaeological or historical) origin or significance were found on site. The site is underlain with Clarens Formation sediments that are highly significant for fossil remains, however, the site is covered in deep sandy soils and it is unlikely that fossils will be observed.

Site Alternative 2

Site alternative 2 is also located on the eastern border of the project property, approximately 740m south of site alternative 1. The vegetation type present on the site is secondary bushveld which showed no evidence of previous disturbance or transformation. The vegetation is of higher sensitivity than that of site alternative 1. The sandy bushveld will also be able to provide suitable habitat to the fauna present on the site. The site is also located more than 500 metres from the wetland on site. The site also contained no sites, features or artifacts of cultural heritage (archaeological or historical) origin or significance. The Palaeontology of the site is also similar to that of site alternative 1, and it is unlikely that any fossils will be found on site.

Preferred Alternative

Site alternative 1 is the preferred alternative for this project for the following reasons:

- The site is located within disturbed secondary bushveld vegetation and will therefore have a minimal impact on the vegetation on site.
- Due to the nature of the vegetation present on the site, development of site alternative 1 will also result in a minimised impact on the fauna present on site.
- The site is located more than 500 metres from the wetland on site.
- The site is relatively flat which is ideal from a construction point of view, as this minimises the amount of excavation work that needs to be done and subsequently the construction costs will be minimised. This will also minimise the indirect impact on the environment as a result of the excavation activities.

6.2.4 Design alternatives

There are no design alternatives that can be considered for the proposed piggery. The layouts and designs have been compiled according to best practice in the pig industry. The pig houses are designed to provide the best environment for the pigs and have the smallest impact on the environment.

6.2.5 Comparative Assessment

An evaluation of the advantages and disadvantages of the different options are given in the table below.

	Site Alternative 1 (preferred alternative)	Site Alternative 2
Advantages	• The site is situated the furthest from the roads surrounding the project property (around portions 50 and 54 of the farm Tweefontein 463 KR). This is positive from a biosecurity point of view. • The site is located more than 500m from the wetland present on site. • The site is located within disturbed secondary bushveld of low sensitivity. • The site is located close to the existing pig houses and the biodigester. This will reduce the transportation distance of pigs to and from the site as well as the transportation of wastewater to the biodigester. • The development of site alternative 1 will result in lesser fragmentation when compared to development of alternative 2. This will allow animals to move above and below this area. • Roads are already established around this site. • No sites of heritage or palaeontological significance are likely to be found on site.	• The site is located within an Ecological Support Area 2. • The site is located furthest from the wetland present on site. • No sites of heritage or palaeontological significance are likely to be found on site.
Disadvantages	• The site is located within an Ecological Support Area 1.	• The site is located within undisturbed sandy bushveld of higher sensitivity. • Development of the site will result in fragmentation and will restrict the movement of animals on site. • The site is located further from existing pig houses and the biodigester system.

		• The site is located closer to the roads surrounding the project property. • No roads are present around site alternative 2.

7. NEED AND DESIRABILITY FOR THE ACTIVITY

The need for and desirability of a proposed activity must specifically and explicitly be addressed throughout the BA process (screening, and assessment) when dealing with individual impacts and specifically in the overall impact summary by taking into account the answers to inter alia the following questions as per the GN 891 of 2014 integrated environmental management guideline series 9 guideline on need and desirability in terms of the 2014 EIA regulations as published on the 20th of October 2014.

The need and desirability for the wean-to-finish unit development is described in this chapter.

Table 29: Need and desirability of the proposed wean-to-finish unit project

Requirement		**Part where requirement is addressed/response**
1.	How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?[4]	The development and its associated elements/aspects will take place on land that was historically disturbed by agricultural activities. Section 8.4 of this report gives a detailed discussion and impact rating of the proposed development on the ecological integrity of the area.
1.1	How were the following ecological integrity considerations taken into account?	
1.1.1	*Threatened Ecosystems.*[5]	A wetland delineation and functional assessment was conducted for the proposed site. A vegetation impact assessment was also conducted on the site. The studies aided in determining the risks posed by the proposed development on the wetland system and vegetation, as rated in section 8.4 of this report. Also refer to sections 4.5 and 4.9 of this report.
1.1.2	*Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific*	A wetland delineation and functional assessment was conducted for the proposed site. The studies aided in determining the risks posed

[4] Section 24 of the Constitution and section 2(4) (a) (vi) of NEMA refer.

[5] Must consider the latest information including the notice published on 9 December 2011 (Government Notice No. 1002 in Government Gazette No. 34809 of 9 December 2011 refers) listing threatened ecosystems in terms of Section 52 of National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

Requirement		Part where requirement is addressed/response
	attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.[6]	by the proposed development on the wetland system, as rated in section 8.4 of this report. Also refer to sections 4.9 of this report.
1.1.3	*Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").*	A vegetation assessment was conducted for the site. According to the vegetation assessment the site lies within an Ecological Support Area in terms of the Mpumalanga Biodiversity Sector Plan. Also refer to section 4.5 of this report.
1.1.4	*Conservation targets.*	The conservation target for the Central Sandy Bushveld is 19% (Mucina & Rutherford, 2006). Also refer to section 4.5 of this report.
1.1.5	*Ecological drivers of the ecosystem.*	Mitigation measures were identified and recommended in section 8.4 of this report and the EMP to avoid, minimise and/or remedy the influence of ecological drivers such as the influence of alien invasive plant species, uncontrolled fire and human activity.
1.1.6	*Environmental Management Framework.*	The Environmental Management Framework for the Waterberg District Municipality identifies agricultural development as a focus area. The Waterberg Agriculture Training programme was included in the EMF.
1.1.7	*Spatial Development Framework.*	The Spatial Development Framework, contained within the Integrated Development Plan for the Bela-Bela Local Municipality, identifies protection of the natural environment and sustainable economic growth, which includes agricultural development as focus areas. The development of the proposed piggery complies with the Spatial Development Objectives.
1.1.8	*Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate*	The activities related to the new wean-to-finish unit will have insignificant contributions towards

[6] Section 2(4)(r) of NEMA refers.

Requirement		Part where requirement is addressed/response
	Change, etc.).[7]	global and international responsibilities.
1.2	How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[8]	A vegetation assessment and vertebrate species richness and habitat assessment were conducted in order to determine the impact of the proposed development on the biological diversity and ecosystems. Refer to sections 4.5 and 4.6 as well as 8.4 of this report for the description of the impact that the proposed development will have on biological diversity. Mitigation measures were identified to minimise the impact of the development on the environment. Refer to section 8.4 of this report.
1.3	How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[9]	Potential negative environmental impacts associated with the development were identified and evaluated in section 8.4 of this report. Mitigation measures were identified and recommended in section 8.4 and the EMP to avoid, minimise and/or remedy negative environmental impacts.
1.4	What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?[10]	Generation of waste, such as building rubble and domestic waste, will take place during the construction phase of the proposed development. Some hazardous waste, such as spilt oil or diesel may also result. Piggery slurry and domestic waste will be generated during the operational phase of the proposed project. Mitigation measures were recommended in section 8.4 of this report and the EMP to effectively manage and minimise waste generated by the development.
1.5	How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to	A Phase 1 Archaeological Impact Assessment was conducted during November 2015. No sites, features or artifacts of cultural heritage origin or

[7] Section 2(4) (n) of NEMA refers.

[8] Section 24 of the Constitution and Sections 2(4) (a) (i) and 2(4) (b) of NEMA refer.

[9] Section 24 of the Constitution and Sections 2(4) (a) (ii) and 2(4)(b) of NEMA refer.

[10] Section 24 of the Constitution and Sections 2(4)(a)(iv) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[11]	significance were found. Refer to section 4.10 of this report. Mitigation measures were identified and recommended in section 8.4 and the EMP to avoid, minimise and/or remedy negative impacts on any resources of cultural heritage.
1.6	How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?[12]	Operation of the pig farm has certain water use requirements. Mitigation measures were recommended in section 8.4 of this report and the EMP to ensure that the non-renewable resources are used efficiently and not wasted.
1.7	How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?[13]	This development will not use or impact upon any renewable natural resources.
1.7.1	*Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that*	The dependency on increased use of resources will not be exacerbated by the proposed development. The intensive nature of the piggery results in less resource usage per pig raised, when compared to less intensive operations.

[11] Section 24 of the Constitution and Sections 2(4)(a)(iii) and 2(4)(b) of NEMA refer.

[12] Section 24 of the Constitution and Sections 2(4)(a)(v) and 2(4)(b) of NEMA refer.

[13] Section 24 of the Constitution and Sections 2(4)(a)(vi) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)	
1.7.2	*Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)*	The resource use is justifiable and will not affect intra- and intergenerational equity. Refer to section 8.4 of this report for the mitigation measures recommended in terms of resource usage.
1.7.3	*Do the proposed location, type and scale of development promote a reduced dependency on resources?*	The proposed development is an intensive animal husbandry operation. Raising a large number of animals in such intensive operations reduces the use of resources per animal raised.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts?[14]	The site for development was chosen on the principles that it is located as far as possible from sensitive areas such as wetlands, drainage lines and undisturbed vegetation. Refer to section 6.2 of this report.
1.8.1	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	It is believed that no knowledge gaps exist in terms of the proposed project, the current state of the environment as well as the potential impacts associated with the proposed project. No uncertainties have been identified. The following assumptions were made: • All information provided by the applicant regarding the proposed project is correct. • The mitigation measures proposed in this report and the EMP are implemented correctly and are effective. • All specialist opinions are accurate. • All research/reference sources are accurate. • There will be no significant changes to the proposed project that could affect the findings

[14] Section 24 of the Constitution and Section 2(4)(a)(vii) of NEMA refer.

Requirement		Part where requirement is addressed/response
		and recommendations of this report and the EMP.
1.8.2	*What is the level of risk associated with the limits of current knowledge?*	Based on the above described gaps, uncertainties and assumptions, it is our opinion that the level of risk associated with the limits of current knowledge is low.
1.8.3	*Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	A risk-averse and cautious approach was applied to this proposed development as the limitations and gaps in knowledge regarding the impacts of the proposed development were taken into account.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following:[15]	
1.9.1	*Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	Refer to section 8.4 of this report for all impacts and mitigation measures associated with this project.
1.9.2	*Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?*	Careful site selection was carried out to ensure minimal impacts on the receiving environment. The preferred site has vegetation of low sensitivity and is located more than 500m from the wetland on site.
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Refer to sections 4.10, 4.14, 6.1 and 8.4 of this report for all impacts associated with this project.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Refer to section 8.4 of this report for all impacts associated with this project.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe	Refer to section 8.4 of this report for all impacts associated with this project. Section 6.2 describes

[15] Section 24 of the Constitution and Sections 2(4)(a)(viii) and 2(4)(b) of NEMA refer.

Requirement		Part where requirement is addressed/response
	how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?[16]	the various alternatives considered for this project.
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?[17]	Refer to section 8.4 of this report.
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:	
2.1.1	*The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,*	The Integrated Development Plan for the Bela-Bela Local Municipality identifies the need for agricultural development. The proposed development therefore fits the needs identified in the IDP.
2.1.2	*Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),*	It is not expected that the proposed development will impact upon spatial priorities and patterns.
2.1.3	*Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and*	The existing land use of the project property is agriculture. The proposed development therefore fits into the current spatial characteristics of the area.
2.1.4	*Municipal Economic Development Strategy ("LED Strategy").*	An economic analysis was conducted as part of the Integrated Development Plan for the Bela-Bela Local Municipality. Agricultural is an important part of the economic activities within the municipality and agricultural development is identified as one of the focus areas.
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Refer to sections 4.14 and 8.4 of this report for all impacts associated with this development.

[16] Section 2(4)(b) of NEMA refer.

[17] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.

Requirement		Part where requirement is addressed/response
2.2.1	*Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?*	The proposed development will complement the local socio-economic initiatives. Agricultural development is identified as a focus point in the Integrated Development Plan for the Bela-Bela Local Municipality as well as the Environmental Management Framework for the Waterberg District Municipality.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?[18]	It is not anticipated that the proposed development will have an impact upon the physical, psychological, developmental, cultural or social needs and interests of the community.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and longterm?[19] Will the impact be socially and economically sustainable in the short- and long-term?	The proposed development will have an equitable impact distribution over the short- (construction phase) and long-term (operational phase). The impacts, as described in section 8.4 of this report, are mostly low taking mitigatory measures into account, for both the construction and operational phases. The development will be sustainable over the short- and long-term as the operation of the piggery is expected to continue for at least the next 30 years.
2.5	In terms of location, describe how the placement of the proposed development will:[20]	
2.5.1	*result in the creation of residential and employment opportunities in close proximity to or integrated with each other,*	Employment opportunities will be created during the construction and operational phases of the new piggery.
2.5.2	*reduce the need for transport of people and goods,*	The proposed project will not have an impact on the transportation of people or goods.
2.5.3	*result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),*	The proposed project will not have an impact on access to public transport or non-motorised and pedestrian transport.
2.5.4	*compliment other uses in the area,*	The development will stimulate other industries, such as the transportation of pig food and other associated supply chain functions. As the land in

[18] Section 2(2) of NEMA refers.

[19] Sections 2(2) and 2(4)(c) of NEMA refers.

[20] Section 3 of the Development Facilitation Act, 1995 (Act No. 67 of 1995) ("DFA") and the National Development Plan refer.

Requirement	Part where requirement is addressed/response
	the vicinity of the project property is also used for agricultural activities, the proposed development will compliment other uses in the area.
2.5.5 be in line with the planning for the area,	The development is in line with the goals for development in the Bela-Bela Local Municipality.
2.5.6 for urban related development, make use of underutilised land available with the urban edge,	Not applicable as the development is not an urban related development and will take place outside urban edges.
2.5.7 optimise the use of existing resources and infrastructure,	Existing road infrastructure will be utilised as far as possible.
2.5.8 opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	Not applicable as bulk infrastructure will not be required for the proposed project.
2.5.9 discourage "urban sprawl" and contribute to compaction/densification,	It is not anticipated that the development will contribute towards “urban sprawl” as the development is not associated with any housing or residential areas.
2.5.10 contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	It is not foreseen that the proposed development will contribute towards the correction of historically distorted settlement spatial patterns or the use of existing infrastructure in excess of current needs.
2.5.11 encourage environmentally sustainable land development practices and processes,	Efficient resource usage, effective waste management and control and mitigation of environmental impacts will encourage environmentally sustainable land development. Refer to section 8.4 of this report for all impacts and mitigation measures associated with this project.
2.5.12 take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	The development site was planned in order to avoid sensitive landscapes such as wetlands, drainage lines and undisturbed vegetation. Refer to sections 4 and 8.4 of this report.
2.5.13 the investment in the settlement or area in question will generate the highest socio-economic returns	The proposed piggery will result in economic returns as a result of job creation, the stimulation

Requirement		Part where requirement is addressed/response
	(i.e. an area with high economic potential),	of the local economy as well as the stimulation of supply chain businesses.
2.5.14	*impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and*	A Phase 1 Archaeological Impact Assessment was conducted during November 2015. No sites, features or artifacts of cultural heritage origin or significance were found. Refer to section 4.10 of this report. Mitigation measures were identified and recommended in section 8.4 and the EMP to avoid, minimise and/or remedy negative impacts on any resources of cultural heritage.
2.5.15	*in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?*	It is not foreseen that the proposed project will act as a catalyst to create a more integrated settlement.
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts?:	A risk-averse and cautious approach was applied by taking into account the limitations and gaps in knowledge regarding the impacts of the proposed development.
2.6.1	*What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*[21]	It is believed that no knowledge gaps exist in terms of the proposed project, the current state of the environment as well as the potential impacts associated with the proposed project. No uncertainties have been identified. The following assumptions were made: • All information provided by the applicant regarding the proposed project is correct. • The mitigation measures proposed in this report and the EMP are implemented correctly and are effective. • All specialist opinions are accurate. • All research/reference sources are accurate. • There will be no significant changes to the proposed project that could affect the findings and recommendations of this report and the EMP.

[21] Section 24(4) of NEMA refers.

Requirement		Part where requirement is addressed/response
2.6.2	*What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?*	Based on the above described gaps, uncertainties and assumptions, it is our opinion that the level of risk associated with the limits of current knowledge is low.
2.6.3	*Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	A risk-averse and cautious approach was applied to this proposed development as the limitations and gaps in knowledge regarding the impacts of the proposed development were taken into account.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1	*Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?*	It is not anticipated that the proposed project will impact significantly on people's health, safety and social ills.
2.7.2	*Positive impacts. What measures were taken to enhance positive impacts?*	Careful site selection was carried out to ensure minimal impacts on the receiving environment. The preferred site has vegetation of low sensitivity and is located more than 500m from the wetland on site. The development of the wean-to-finish unit will also contribute to food safety in South Africa.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	It is not anticipated that the development's socioeconomic impacts will result in new, direct ecological impacts.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?[22]	Refer to section 6 of this report.
2.10	What measures were taken to pursue environmental justice so that adverse environmental	Refer to section 6 of this report. The alternatives identified allow for the "best practicable

[22] Section 2(4)(b) of NEMA refers.

Requirement		Part where requirement is addressed/response
	impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?[23] Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	environmental option" to be selected.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?[24]	Local labourers up to a certain skills level will be employed during the construction phase of the development.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?[25]	Mitigation measures were recommended to ensure that the environmental impacts of the proposed development were addressed. Refer to section 8.4 for all environmental impacts identified and mitigation measures proposed for the development.
2.13	What measures were taken to:	
2.13.1	*ensure the participation of all interested and affected parties,*	The public participation process for this project was conducted by Shangoni Management Services in terms of: • The procedures and provisions in terms of the NEMA (as amended), 2008; • Chapter 6 of the EIA Regulations of 2014; • GN 807: Public Participation Guideline in the Environmental Impact Assessment Process, date October 2012; and • Other relevant legislation such as the Promotion of Access to information Act (PAIA), 2000. Also refer to section 5 of this report.

[23] Section 2(4)(c) of NEMA refers.

[24] Section 2(4)(d) of NEMA refers.

[25] Section 2(4)(e) of NEMA refers.

Requirement	Part where requirement is addressed/response
2.13.2 provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,[26]	The public participation process is open to all parties. Public notices and a newspaper advertisement were distributed to encourage participation.
2.13.3 ensure participation by vulnerable and disadvantaged persons,[27]	The public participation process is open to all parties, including vulnerable and disadvantaged persons.
2.13.4 promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,[28]	All employees will undergo environmental awareness/training.
2.13.5 ensure openness and transparency, and access to information in terms of the process,[29]	The public participation process for this project was conducted by Shangoni Management Services in terms of: • The procedures and provisions in terms of the NEMA (as amended), 2008; • Chapter 6 of the EIA Regulations of 2014; • GN 807: Public Participation Guideline in the Environmental Impact Assessment Process, date October 2012; and • Other relevant legislation such as the Promotion of Access to information Act (PAIA), 2000. Also refer to section 5 of this report. Therefore, the process was open and transparent and the public had access to all documents. All public comments have been included in this document and were adequately addressed.
2.13.6 ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge[30]*, and*	The public participation process for this project was conducted by Shangoni Management Services in terms of: • The procedures and provisions in terms of the NEMA (as amended), 2008; • Chapter 6 of the EIA Regulations of 2014;

[26] Section 2(4)(f) of NEMA refers.

[27] Section 2(4)(f) of NEMA refers.

[28] Section 2(4)(h) of NEMA refers.

[29] Section 2(4)(k) of NEMA refers.

[30] Section 2(4)(g) of NEMA refers.

Requirement		Part where requirement is addressed/response
		• GN 807: Public Participation Guideline in the Environmental Impact Assessment Process, date October 2012; and • Other relevant legislation such as the Promotion of Access to information Act (PAIA), 2000. Also refer to section 5 of this report.
2.13.7	*ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?*[31]	The public participation process for this project was conducted by Shangoni Management Services in terms of: • The procedures and provisions in terms of the NEMA (as amended), 2008; • Chapter 6 of the EIA Regulations of 2014; • GN 807: Public Participation Guideline in the Environmental Impact Assessment Process, date October 2012; and • Other relevant legislation such as the Promotion of Access to information Act (PAIA), 2000. Also refer to section 5 of this report.
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?[32]	Local labourers up to a certain skills level will be employed during the construction phase of the piggery.
2.15	What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?[33]	All contractors, sub-contractors and workers will attend compulsory environmental awareness training and inductions. This training will highlight the dangers associated with the workplace. Procedures relating to environmental risks will also be put in place and will regularly be updated.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	*the number of temporary versus permanent jobs*	25 temporary jobs will be created during the

[31] Section 2(4)(q) of NEMA refers.

[32] Section 2(4)(g) of NEMA refers.

[33] Section 2(4)(j) of NEMA refers.

Requirement		Part where requirement is addressed/response
	that will be created,	construction phase and 6 permanent jobs will be created during the operational phase of the development.
2.16.2	*whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),*	Local labourers up to a certain skills level will be employed during the construction phase of the piggery.
2.16.3	*the distance from where labourers will have to travel,*	Labourers will be transported to and from the construction site and their current homes.
2.16.4	*the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and*	The location of job opportunities will be in close proximity to the proposed development
2.16.5	*the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).*	The development will create job opportunities without impacting on employment opportunities in other sectors.
2.17	What measures were taken to ensure:	
2.17.1	*that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and*	All applicable environmental legislation was considered and adhered to during the Basic Assessment process. Refer to section 2 of this report.
2.17.2	*that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?*	The public participation process for this project was conducted by Shangoni Management Services in terms of: • The procedures and provisions in terms of the NEMA (as amended), 2008; • Chapter 6 of the EIA Regulations of 2014; • GN 807: Public Participation Guideline in the Environmental Impact Assessment Process, date October 2012; and • Other relevant legislation such as the Promotion of Access to information Act (PAIA), 2000. Also refer to section 5 of this report.
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the	All mitigation measures proposed as part of this Environmental Impact Assessment process have been focussed on minimising the potential impacts associated with the proposed

Requirement		Part where requirement is addressed/response
	environment will be protected as the people's common heritage?[34]	development. The focus is on the protection of the environment through various measures, including pollution minimisation. The piggery has also been designed with the environment in mind by, for example, including the effective management of wastewater and manure collection into the designs for the piggery.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?[35]	The mitigation measures are realistic, as also described in item 2.18 above. Also refer to sections 8 and 9 of this report.
2.20	What measures were taken to ensure that he costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?[36]	The applicant will be responsible for the costs of any pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?[37]	Refer to sections 6 and 8.5 of this report.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?[38]	Cumulative impacts are described in section 8.4 of this report.

A need and desirability for this project is evident from the following perspectives:

[34] Section 2(4)(o) of NEMA refers.

[35] Section 240(1)(b)(iii) of NEMA and the National Development Plan refer.

[36] Section 2(4)(p) of NEMA refers.

[37] Section 2(4)(b) of NEMA refers.

[38] Regulations 22(2)(i)(i), 28(1)(g) and 31(2)(1) in Government Notice No. R. 543 refer.

7.1 Developer / Applicant

The current demand for pork is South Africa is not being met. Therefore, there is an opportunity for the applicant, Humphries Boerdery, to expand their operation to supply larger quantities of pork in the existing market demand. The piggery will generate a source of income for the applicant and is therefore desirable from and economic point of view.

7.2 Local Community

According to the 2011 census (Statistics South Africa, 2011), the unemployment rate for the Bela-Bela Local Municipality is 22.5%. The development of a new piggery will create employment opportunities for the local community on a temporary and permanent basis. The continued, sustainable operation of the piggery will benefit the local community by ensuring continued employment of local workers.

7.3 District and Provincial Benefit

The development of the piggery complies with the Integrated Development Plans for the Bela-Bela Local and Waterberg District Municipalities. The need for sustainable agricultural practices is identified in these documents.

A considerable amount of contract work is also associated with the construction and operation of a piggery, thereby creating secondary employment opportunities. Contract work may include:

- Construction companies;
- Feed supply companies; and
- Transportation of pigs to and from the piggery.

The proposed project will also contribute to economic development and food security in South Africa.

8. ENVIRONMENTAL IMPACT ASSESSMENT

8.1 Aims of Environmental Impact Assessment

Potential environmental impacts (biophysical) associated with the proposed Humphries Boerdery Wean-to-Finish Site have been identified. This Basic Assessment process aims to adequately investigate and address all potentially significant environmental issues in order to provide the Limpopo Department of Economic Development, Environment and Tourism with sufficient information to make an informed decision regarding the proposed project.

This part of the document focuses on the identification of the major potential impacts that the proposed activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the site, as required in terms of R.983 of the EIA Regulations, 2014.

The EIA aims to achieve the following:

- To provide a detailed assessment of the biophysical environments affected by the proposed project;
- To assess impacts on the study area in terms of environmental criteria; and
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts.

This BAR addresses the following:

- A detailed description of the proposed project;
- Detailed assessment of the impacts identified that were determined to be potentially significant;
- Recommendations regarding the mitigation of significant impacts; and
- To meet the requirements and to comply with the necessary legislation and Acts.

Any specialist studies are combined into this consolidated report to allow for easy assessment of the potential aspects with associated impacts.

8.2 Methodology of assessing the environmental impacts

It is required by Appendix 1 paragraph 3 (1) (j) of the 2014 EIA Regulations that impacts and risks on the surrounding environment, as a result of the proposed activity, are identified during the Basic Assessment Phase.

Identification of the major potential impacts has been included in this Basic Assessment Report.

Impact assessments should be conducted based on a methodology that includes the following:

- Clear processes for impact identification, predication and evaluation;
- Specification of the impact identification techniques;
- Criteria to evaluate the significance of impacts;
- Design of mitigation measures to lessen impacts;
- Definition of the different types of impacts (indirect, direct or cumulative); and
- Specification of uncertainties.

In broad terms, the impact assessment for this project will include the following:

- All potential impacts of the proposed activity will be identified and assessed;
- The nature, significance, consequence, extent, duration and probability of all impacts will be predicted; degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed or mitigated.
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity.
- Identify suitable measures to avoid, manage or mitigate identified impacts,
- Identity residual risks that need to be managed and monitored.

The construction, operational and decommissioning phases of the project will be considered whilst identifying impacts. A detailed understanding of the proposed activity will be obtained to ensure that all the potential impacts are identified. The following process will be followed to identify and assess the potential impacts of the proposed activity:

- The current environmental conditions will be determined in detail. This will act as a baseline against which impacts can be identified and measured;
- The changes that will occur in future, should the proposed activity not occur, will be identified;
- A detailed understanding of the activity will be obtained in order to fully understand its consequences; and
- The significant impacts that will occur as a result of the proposed activity will be identified (should the activity be authorised).

After all impacts have been identified, the nature of each impact can be predicted. The impact prediction will take into account physical, biological, socio-economic and cultural information and will then estimate the likely parameters and characteristics of the impacts. The impact prediction will aim to provide a basis from which the significance of each impact can be determined and appropriate mitigation measures can be developed.

The risk assessment methodology is based on defining and understanding the three basic components of the risk, i.e. the source of the risk, the pathway and the target that experiences the risk (receptor). Refer Figure 20 below for a model representing the above principle (as contained in the DWA's Best Practice Guideline: G4 – *Impact Prediction.*

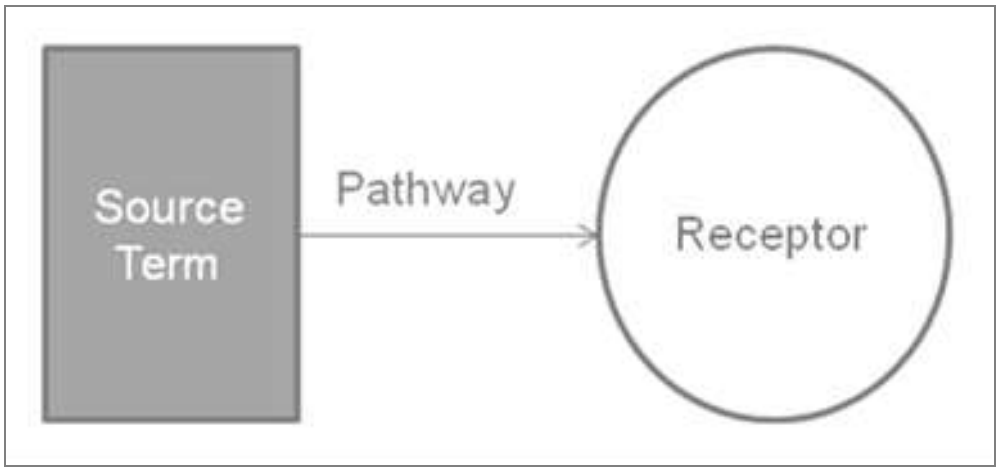


Figure 20: DWS' model for Impact Prediction (Risk Assessment)

Table 30 and Table 31 below indicate the methodology to be used in order to assess the Probability and Magnitude of the impact, respectively, and Table 32 provides the Risk Matrix that will be used to plot the Probability against the Magnitude in order to determine the Severity of the impact.

Table 30: Determination of Probability of Impact

Frequency of Aspect / Unwanted Event	Score	Availability of pathway from the source to the receptor	Score	Availability of receptor	Score
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

***Step 1**: Determine the **PROBABILITY** of the impact by calculating the average between the Frequency of the Aspect, the Availability of a pathway to the receptor and the availability of the receptor.*

Table 31: Determination of Magnitude of Impact

SOURCE								RECEPTOR			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
Lasting days to a month	1	Effect limited to the site. (metres);	1	Very small quantities / volumes / intensity (e.g. < 50L or < 1Ha)	1	Non toxic (e.g. water) / Very low potential to create damage or destruction to the environment	1	Bio-physical and/or social functions and/or processes will remain unaltered.	1	Current environmental component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	1
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some environmental sensitivity (scarce / valuable environment etc.).	3
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organisation / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, protected habitats etc.)	5

*Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors above.*

Table 32: Determination of Severity of Impact

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

*Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for Probability and Magnitude in the table below.*

This part of the document focuses on the identification of the major potential impacts including positive and negative, the activities, processes and actions may have on the surrounding environment. It indicates the major impacts that these activities may have on the environmental components associated with the site, as required in terms of Appendix 1 paragraph (h) of the 2014 EIA Regulations.

8.3 Project phases and activities to be undertaken

For the purposes of this impact assessment, the project timeframe will be subdivided into the following four phases:

- Design and Planning Phase;
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Potential cumulative impacts were also identified, where applicable.

8.3.1 Design and Planning Phase

- Designing and planning of the new piggery; and
- Planning for construction of the new piggery.

8.3.2 Construction Phase

- Laydown of material within the construction footprint area;
- Excavation of trenches for the foundations of the platforms for the pig houses as well as the canals for the transportation of wastewater;
- Construction of the foundations of the platforms and canals for wastewater transportation;
- Construction of the houses on top of each platform;
- Installation of infrastructure, such as the water reservoir, backup generator, feed silos and water and feed supply to each house; and
- Rehabilitation of the construction site.

8.3.3 Operational Phase

- Operational activities of the piggery including loading and offloading of pigs;
- Routine maintenance of the piggery;
- Repair work when required;
- Canalisation of wastewater to existing biodigester;
- Canalisation of wastewater to wastewater irrigation handling system;
- Management of wastewater in the biodigester and wastewater irrigation handling system; and
- Re-use of the liquid wastewater fraction as a source of plant nutrients (organic fertiliser).

8.3.4 Decommissioning Phase

Decommissioning of the piggery is not anticipated for the foreseeable future. Should the piggery be decommissioned, a detailed closure and rehabilitation plan will be submitted to the Limpopo Department of Economic Development, Environment and Tourism prior to decommissioning.

8.4 Impacts identified

The main impacts identified for the Humphries Boerdery Wean-to-Finish Site project are listed below. The Environmental Management Programme report (EMPr) will set out mitigation measures to be implemented during the Construction, Operational and Decommissioning Phases.

8.4.1 Impacts associated with the proposed development of a piggery (GN. No. 983, Listing Notice 1 of 4 December 2014: Activity Numbers 4 and 27)

8.4.1.1 Planning and Design

Table 33: Environmental Impact Assessment: Planning and Design

Activity:
- Design and planning of the proposed piggery.
- Design and planning of the wastewater transportation system.
- Planning for the construction phase of the piggery.

Aspect:
- **Inadequate planning and design of the piggery.**
- **Inadequate design and planning of the wastewater transportation system.**
- **Inadequate planning for the construction phase of the piggery.**

Nature and significance of environmental impact

Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Project Phase Applicability: Planning and Design Phase: X; Construction: ; Operation: ; Decommissioning:											
Impact Description: Harm to the environment due to inadequate planning and design of the piggery unit. Extent of impact: Local Duration of impact: Results of poor planning will last during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	3	M	To prevent harm to the environment through effective and thorough planning and design, taking the environment into consideration.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative action is taken. If planning is not adequate, the impact may become irreversible. Mitigation: • Development planning, including stormwater and wastewater management, must ensure that the construction and operation of the piggery will not impact on the environment. • Project engineers should compile a method statement, outlining the construction methodologies. Mitigation measures should be included in this method statement which must be approved by the ECO and be available on site. Mitigation measures will be included in the EMP where relevant.	During the planning and design of the piggery.	• Facility manager • Design engineer	2	2	L	• NEMA, 1998
Impact Description: Soil, surface water and groundwater pollution from the ineffective containment of the piggery wastewater. Extent of impact: Local Duration of impact: Results of poor planning will last during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	4	H	To ensure effective design of the wastewater handling system so that no environmental harm results when the system becomes operational.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative action is taken. If planning is not adequate, the impact may become irreversible. Mitigation: • The wastewater handling system should be properly designed and installed so that the piggery waste is effectively removed from the houses. • The wastewater handling system must have an impermeable concrete floor. • Overflow of the wastewater handling system must be prevented.	During the planning and design of the piggery.	• Facility manager • Design engineer	2	3	M	• NEMA, 1998 • NWA, 1998

					Ensure sufficient freeboard to guarantee facility integrity during heavy rainfall events.						
Impact Description: • Delays due to poor planning. • Legal non-compliances to the Environmental Authorisation and EMP. • Harm to the environment. Extent of impact: Local Duration of impact: Results of poor planning will last during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	3	M	To ensure pro-active planning for the construction phase of the piggery.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative action is taken. If planning is not adequate, the impact may become irreversible. Mitigation: • The approved EMP and Environmental Authorisation must be binding on the construction contractor and included in the contracts. • Adequate planning and scheduling of the construction activities to allow for disruptions caused by rain and wet conditions. The scheduling must make provision for environmental training/awareness raising for workers prior to the commencement of construction. Records of training must be maintained. • Appoint an independent Environmental Control Officer (ECO) prior to the commencement of the construction phase. • Ensure that a complaints register is kept at the construction site from the first day of construction. • Ensure that the Environmental Authorisation and EMP are kept at the construction site from the first day of construction. • A construction site plan must be compiled and approved by Humphries Boerdery and the ECO. The site plan must include the location of the construction camp, toilets, stores and site office.	During the planning and design of the piggery.	• Facility manager • Design engineer	2	2	L	• NEMA, 1998

8.4.1.2 Environment in General

Table 34: Environmental Impact Assessment: Environment in General

Activity: • Construction activities for the establishment of a new piggery. • Operational activities at the piggery.											
Aspect: • **Lack of knowledge amongst workers and contractors in terms of the impact their actions may have on the environment.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	**X**											
	Operation	**X**											
	Decommissioning												
Impact Description: Harm to the environment in general (including pollution of soil and water resources, as well as harm to employees). Extent of impact: Local			3	4	H	To prevent harm to the environment due to lack of knowledge.	Degree to which the impact can be reversed: Largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Compliance to the Environmental Authorisation and Environmental	During the construction and operational phases.	• Construction contractor • Facility manager • ECO	2	2	L	• NEMA, 1998

Duration of impact: Lasting during the construction phase and operational phase.					Management Programme must form part of agreements with all construction or operational phase contractors. • The contractor is to ensure that all employees, including subcontractors and their employees, attend onsite Environmental Awareness Training prior to commencing work onsite. • Follow-up Environmental Awareness Training may be required from time to time as new subcontractors, crews or employees commence work or for specific activities that may potentially impact upon the environment. • The contractor and facility manager is to maintain accurate records of any training undertaken. • The ECO shall monitor the contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. • All construction workers shall be issued with ID badges and clearly identifiable uniforms. • Training is to cover all aspects of the EMP and procedures to be followed. • A complaints register must be maintained on site. The register must record the following: Date when the complaint was received, name of the person who reported the complaint, details of the complaint and when and how the concern was addressed.						

8.4.1.3 Geology and Soil

Table 35: Environmental Impact Assessment: Geology and Soil

Activity:											
• Construction and operation of the wean-to-finish unit. • Stockpiling of topsoil and cleared vegetation. • Site clearance. • Replacement of topsoil and revegetation. • Vegetation establishment as part of the rehabilitation.											
Aspect:											
• **Soil erosion.** • **Topsoil being exposed to the elements.** • **Prolonged exposure of cleared areas.** • **Poor topsoil replacement and establishment of vegetation.** • **Unsatisfactory establishment of vegetation.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	**X**											
	Operation	**X**											
	Decommissioning												

Impact Description: Exposure to soil erosion. Erosion can lead to destruction of natural habitats and sedimentation of proximate watercourses. Extent of impact: Local Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	4	H	To prevent soil erosion and subsequent sedimentation of proximate watercourses.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • The contractor is to ensure that all reasonable measures are taken to limit erosion during the construction phase. • All areas susceptible to erosion should be protected. Erosion protection measures include sand bags, cut-off drains and/or berms. • Do not allow erosion to develop to a large scale before taking action. • Existing roads and tracks should be used as far as possible. • Retain vegetation and soil in position as long as possible. It should only be removed immediately ahead of construction (DWAF, 2005). • Remove only the vegetation essential for construction. No disturbance of adjoining vegetation should be allowed. • Colonisation of the disturbed areas should be monitored to ensure that vegetation cover is sufficient within one growing season. If not, the area has to be rehabilitated. • Stormwater Management Measures should be implemented: ▪ Clean stormwater runoff generated upstream and from the roofs of the pig houses will be channelled between the group houses via stormwater runoff channels. ▪ Stormwater channels should be regularly monitored for impeding structures.	During the construction phase.	• Construction contractor • Facility manager • ECO	2	2	L	• NEMA, 1998 • DWAF, 2005
Impact Description: Degradation and loss of valuable resource (topsoil) due to exposure of topsoil to the elements. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	3	M	To reduce the duration and extent of exposure of topsoil in order to preserve and protect it as a resource.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Disturbance of areas shall only take place as per the approved construction plan signed by the ECO and representatives from Humphries Boerdery thus limiting disturbance to the approved areas. • Topsoil is to be stockpiled in discrete areas and retained for future landscaping. • Any sub-soil or rocks removed should also be stockpiled separately and be used during rehabilitation. • If sterilisation of the topsoil has occurred during stockpiling, inorganic fertilisers can be used to supplement the soils before seeding of the areas take place. • Replace topsoil concurrent with construction, whenever possible. • Cordon off areas under rehabilitation using danger tape or similar demarcation to prevent vehicular, pedestrian and livestock access. • Aim to replace topsoil to its original depth (approximately 150mm). • If there is not enough topsoil available from a particular soil zone, topsoil of a similar quality may be used to replace it. The suitability of substitute topsoil should be determined by a soil analysis. • Compacted soil should be ripped to ensure effective re-vegetation. • Work necessary additives, as indicated by the soil analysis, into the soil.	During the construction and operational phases.	• Construction contractor • Facility manager • ECO	2	2	L	• NEMA, 1998

					• Re-vegetation with indigenous grass species. • If areas show no specific vegetation growth within three months, the areas shall receive additional topsoil, be ripped to a depth of 100mm and re-planted. • Soil stabilising measures could include rotovating in straw bales (at a rate of 1 bale/20m^2), applying mulching or brush packing, or creating windbreaks using brush or bales. • The site must have an adequate and effective stormwater management system in place. • Stormwater measures should be inspected on a regular basis in order to ensure that the structures are functional and not causing soil erosion. • Where necessary, place culverts underneath road foundations.						
Impact Description: Vegetation establishment, as part of the rehabilitation of cleared areas and the construction site, may not be effective and this may lead to erosion of bare areas. Extent of impact: Local Duration of impact: Lasting during the operational phase.	3	3	M	To prevent erosion of bare areas by ensuring vegetation establishment.	Degree to which the impact can be reversed: Reversible with human intervention, if immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Re-vegetated areas should be continuously monitored to verify whether the vegetation is growing and covering bare areas. • If areas show no specific vegetation growth within three months, areas must receive additional topsoil, be ripped to a depth of 100mm and re-planted. • Fertilisers can also be used to promote growth of vegetation.	During the operational phase.	• Facility manager • ECO	2	2	L	• NEMA, 1998

8.4.1.4 Atmosphere and Noise

Table 36: Environmental Impact Assessment: Atmosphere and Noise

Activity:											
• Construction activities. • Excavation activities, loading and offloading activities and vehicles travelling to and from the site. • Increased traffic to and from the site. • Operational activities at the piggery. • Waste management on site.											
Aspect:											
• Release of emissions and odours from the piggery, mortalities and wastewater irrigation handling system, and subsequent nuisance. • Dust generation. • Generation of noise and nuisance.											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	**X**											
	Operation	**X**											
	Decommissioning												

Impact Description: Degradation of ambient air quality and nuisance due to odour generation from the piggery, ammonia emissions, its wastewater management practices and mortality management. The generation of odours depend on the design of the piggery, the wastewater handling system as well as how the piggery is managed. The impact of any odours that are generated depends upon the topography and climate of the site (www.daf.qld.gov.au/environment/intensive-livestock/piggeries/managing-environmental-impacts/odour). The main sources of odours at intensive piggery operations include the following: • Poorly maintained pig houses; • Inadequate housekeeping; and • Inadequate or poorly maintained wastewater system and storage of wastewater (ARMCANZ/ANZECC, 1999). Odours are also generated from the decomposition of manure and waste food at the piggery (www.daf.qld.gov.au/environment/intensive-livestock/piggeries/managing-environmental-impacts/odour). The main constituents of piggery wastewater that need to be considered from an environmental protection perspective include potassium, dissolved solids, sodium, ammoniacal compounds, organic matter, phosphorous and nitrogen from urine and faeces. The wastewater generally has elevated levels of volatile organic solids, nutrients and possibly salts and can also contain disinfectants used to wash the houses, veterinary chemicals and metals such as copper and zinc. The organic components are readily biodegradable (ARMCANZ/ANZECC, 1999). Toxic compounds in the wastewater sludge, such as heavy metals and pathogens, can, however, also be detrimental to the environment. The proposed management of the piggery wastewater will entail canals to relay wastewater to an existing biodigester. Extent of impact: Local Duration of impact: Lasting during the operational phase and for the duration thereof.	4	3	H	To minimise atmospheric emissions, odour generation and the subsequent nuisance it causes.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Ventilation points on the piggery houses must be as high as possible (>1.0m) so that the exiting gases enter the air column as high as possible. • Covering the wastewater irrigation system can reduce odorous emissions. • Wastewater spillages must be prevented. • Effective housekeeping and best management practices must be implemented. Houses should be cleaned and maintained on a regular basis. • Drains and treatment systems should be well maintained. • Disposal of wastewater should be done in accordance with DWS and WRC guidelines. • Ensure adequate ventilation of houses. • Keep wastewater drains clean. • Avoid ponding and irrigation with biodegradable industrial wastewater during wet conditions. • Avoid excessive build-up of manure within the houses and below the floor area. • Regularly flush wastewater from the houses. • If, existing tree cover is insignificant, trees should be planted around the piggery to act as buffers (www.daf.qld.gov.au/environment/intensive-livestock/piggeries/managing-environmental-impacts/odour). • Mortalities must be removed on a daily basis. • Mortalities must be stored in enclosed areas prior to being taken to the crocodile farm. • The biodigester must be well managed and monitored. • Any runoff from the pits should be contained and diverted to the wastewater handling system (www.daf.qld.gov.au/environment/intensive-livestock/piggeries/managing-environmental-impacts/pig-carcass-composting). • Inform neighbours in advance of any maintenance activities that my lead to odour nuisance. • A complaints register should be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed.	During the operational phase.	• Facility manager • ECO	3	2	M	• NEMA, 1998 • NWA, 1998
Impact Description: Degradation of ambient air quality due to dust and exhaust emission generation. Extent of impact: Local	3	3	M	To minimise the impact of construction activities, excavation activities, loading and offloading activities and increased	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible.	During the construction and operational phases.	• Construction contractor • Facility manager • ECO	2	2	L	• NEMA, 1998

Duration of impact: Lasting during the construction phase and the operational phase and for the duration thereof.				traffic to and from the site on the ambient air quality.	Mitigation: • A water cart should be onsite to water down dusty roads. • Speed bumps and traffic signs should be erected to reduce speeding onsite. • A complaints register should be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed. • Open areas should be re-vegetated. If the soil is compacted, it should be ripped and fertilised. • Regular maintenance of vehicles and equipment should be undertaken. Optimal engine combustion will allow for "cleaner" exhaust emissions.						
Impact Description: According to Jorgensen & Johnson (1981), the noise levels created by general construction activities on a building site can reach levels of approximately 70 dB, caused by for instance heavy machinery. It can therefore be assumed that the proposed development will have a negative impact on the environmental noise of the area once construction starts. Sound is inversely proportional to the distance from the source and can get absorbed by buildings and vegetation barriers. Noise intensities (dB) will be at their highest on site and will decrease as one moves away from their sources. The noise decline curve gives an indication of how noise generated at the site will decrease with distance. It gives an indication of the distance that the sound would have travelled upon reaching a level of 60 dB, prescribed by the SABS as being the acceptable limit for environmental noise. According to noise decline curve, at a distance of 27 metres from the construction site, the generated noise would have decreased to a level of 60 dB and at a distance of 45 metres it would have decreased to approximately 55dB. It can therefore be said that noise travelling further than 45 metres will have a low impact on neighbouring farms and residential areas. The distance to sensitive noise receptors (residences) is more than 45 metres in all cases. During the operational phase, noise will be generated by the ventilation equipment, transport vehicles and the pigs themselves. Noise levels at the piggery should not exceed 55dB during daytime hours and 45dB during night time hours. Increased noise levels during the operational phase can be caused by the animals, when they are unsettled, disturbed or excited. For example, pigs that are fed at designated times during the day become exciting when the feed cart approaches. At the proposed piggery, the pigs will	3	2	M	To minimise noise generation on the site.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Activities that will generate the most noise should be scheduled during times of the day that will result in least disturbance to neighbours. • Site workers and contractors will adhere to the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) regarding hearing protection and noise control measures. • Regular maintenance of vehicles, equipment and fans should be done. • Conveyors/augers should not be run when empty. • Working hours should be restricted to daylight hours. • No sound amplification equipment such as sirens, loud halers or hooters are to be used on site except in emergencies. • No amplified music is permitted on site. • If work is to be undertaken outside normal work hours, permission must be obtained from the ECO and the facility manager. • No noisy work is to be conducted over the weekends or on public holidays. • Unnecessary disturbance of the pigs should be avoided. • Vehicles travelling to and from the site during night time hours must be kept to a minimum. • A complaints register should be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how the concern was addressed.	During the construction and operational phases.	• Construction contractor • Facility manager • ECO	2	2	L	• NEMA, 1998 • OHSA, 1993

have permanent access to feed and will therefore not routinely become excited during the day. The piggery houses will be solidly constructed and will largely contain noise generated by the pigs. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.											

8.4.1.5 Soil, surface water, stormwater and groundwater

Table 37: Environmental Impact Assessment: Soil, surface water, stormwater and groundwater

Activity:

- The handling, storage, mixing and disposal of cement and concrete.
- The cleaning of equipment and construction areas.
- Handling, storage and disposal of general, domestic and hazardous waste.
- Installation and use of ablution facilities.
- Storage and handling of hazardous chemical substances including fuel, greases and oils.
- Vehicle and equipment maintenance and refuelling.
- Construction and operation of the piggery, its wastewater transportation system and mortality management system.
- Stormwater runoff on site.

Aspect:

- **Concrete and cement spillage.**
- **Generation and runoff of contaminated wash water.**
- **Poor waste management.**
- **Unsanitary conditions on site.**
- **Poor management and spills of hazardous chemical substances including fuel, greases and oils.**
- **Leaking and/or spilling of fuels, greases and oils.**
- **Inadequate construction and management of the piggery, its wastewater transportation and mortality management system.**
- **Contamination of clean runoff water.**

Nature and significance of environmental impact

Impact Description			Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
			Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Project Phase Applicability	Construction	X											
	Operation	X											
	Decommissioning												
Impact Description: Soil and surface water pollution as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete. Extent of impact: Local Duration of impact: Lasting during the construction phase			3	3	M	To prevent pollution of soil and surface water.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Cement may only be mixed on an impermeable surface (not bare soil).	During the construction phase.	• Construction contractor • Facility Manager • ECO	2	3	M	• NEMA, 1998

and a possibility of extending into the operational phase and for the duration thereof.					• Dry cement must be removed from the soil surface to prevent an impermeable layer forming on top of the soil. The cement must be disposed of with building rubble. • Ready-mix trucks are not permitted to clean chutes onsite. Cleaning into foundations or a dedicated cleaning pit is permitted. • Bricklayers and plasterers are to minimise any cement spills or runoff in their work area. They also have to ensure that the work area is cleaned of all cement spillage at the end of each workday. • Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff. • Soil contaminated by cement or concrete, including residue produced by the washing of cavities, are to be removed immediately after the spillage has occurred and disposed of appropriately. • Measures must be taken to prevent dirty water (wash water) from contaminating a watercourse. Water has to be contained by excavations or berms. • The following measures should be implemented at the concrete mixing area: ▪ Concrete may only be mixed in designated and demarcated areas. ▪ The mixing area must be established on a compacted earth platform. ▪ Stormwater must be diverted around the mixing area. ▪ Any concrete spillages must be removed by the contractor and disposed of at a licensed disposal site. ▪ After use, all waste remaining at the mixing area must be removed and disposed of at a licensed disposal site.						
Impact Description: Soil and surface water pollution through contaminated wash water. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	3	M	To prevent soil and surface water pollution.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • No vehicles are permitted to be washed on site. • A dedicated, temporary cleaning area (such as a plastic lined pit, plastic or metal drums located close to a water point) is to be identified to facilitate washing of cement and painting equipment. • No wastewater/wash water may be disposed of on site, onto the soil or into any water body. • Runoff from the washing of equipment is to be contained against the building by excavations of berms around the foundations.	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2	2	L	• NEMA, 1998
Impact Description: Soil, surface water and groundwater pollution due to poor waste management (including biological waste generated on site). Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	4	H	To prevent soil, surface water and groundwater pollution.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Building waste must be disposed of at a landfill site. • Sufficient waste bins, skips or bulk containers should be installed. Containers must be available on site at all times.	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2	3	M	• NEMA, 1998

					• All containers (bins, skips and bulk containers) must be kept clean and hygienic. • Containers (bins, skips and bulk containers) utilised for the disposal of general and hazardous waste must be demarcated accordingly. • Waste material may only be temporarily stored in areas demarcated for such storage. • General waste must be stored in a manner that prevents the harbouring of pests. • General waste should always be stored or disposed of separately from hazardous waste. • Skips or bulk containers should be removed to a licensed landfill site on a regular basis. No build-up of waste is permitted onsite. • A waste management plan should be implemented. The waste management plan should consider the type of waste, description, source, storage, disposal method, disposal facility and responsible person. • No incineration of any kind of waste will be permitted onsite. • The facility should be fenced off in order to ensure high health herd status. • Strict biosecurity measures should be employed. Such measures include: ▪ Limit nonessential access and traffic to the farm. ▪ Clean and disinfect livestock and feed haulers. ▪ Keep a record of all visitors and deliveries. ▪ Have one combined entrance and exit. ▪ Provide disinfectant and appropriate footwear. ▪ Implement policies with regards to visiting livestock facilities. ▪ Take precaution when buying livestock, feed and equipment. ▪ Prevent contact between healthy and sick animals. ▪ Implement pest control measures. ▪ Prevent contact between livestock and waste generated on the site. • The piggery should consist of platforms in which specific categories of pigs are housed. • Animal housing should have slatted floors that capture waste in a sealed biodegradable industrial wastewater store facility of 50 – 60cm deep with a storage capacity of at least 28 days. • All biodegradable industrial wastewater receiving and conducting canals should be concrete canals. • The concrete biodegradable industrial wastewater collection pit to which wastewater is fed should have an additional 10 days' collection capacity.					
Impact Description: Soil, surface water and groundwater pollution due to unsanitary conditions onsite. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	2	3	M	To prevent soil, surface water and groundwater pollution.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Sufficient ablution facilities shall be provided – minimum of 1 toilet per 15 workers.	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2	2	L	• NEMA, 1998

					• Ablution facilities should be on impermeable surfaces and at least 50m from wetlands, drainage lines or places where stormwater may accumulate. • The location of the ablution facilities is to be approved by the ECO prior to site establishment, but shall be located within 100m of any work point. • Ablating anywhere other than in the toilets shall not be allowed. • Ablution facilities are to be secured. • The contractor shall ensure that no chemicals and/or waste from the ablution facilities are spilled on the ground at any time. • Ablution facilities should be serviced weekly or more frequently if required. • Contents are to be removed from site on a regular basis. • Ablution facilities should be inspected and maintained to prevent and minimise blockage and leakages. • Toilets should have properly closing doors and be supplied with toilet paper. • Awareness of the importance of proper hygiene should be created among employees. • The septic tank should be cleaned and de-sludged at least once a year.						
Impact Description: Soil, surface water and groundwater pollution due to poor management and accidental spills of hazardous chemical substances including fuel, greases and oils used onsite. Extent of impact: Local Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	3	M	To prevent soil, surface water and groundwater pollution by hazardous chemical substances.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Identify all hazardous chemical substances used onsite including fuel, greases and oils. • Obtain the material safety data sheet of each of the hazardous chemical substances. • Ensure that the material safety data sheets have sufficient information to enable the user to take the necessary measures to protect his/her health and safety and that of the environment. • Material Safety Data Sheets for all hazardous chemical substances must be readily available on site. • Keep a stock inventory register of all chemicals in the store. • Powders must be stored above liquids. • Proper storage of chemicals in a lockable, well ventilated building. • Use chemicals with low toxicity and low water contamination potential, as far as possible. • Ensure adequate access control for the storage area. • Storage areas for hazardous chemicals are to comply with standard fire safety regulations. • Safety signage including “No Smoking”, “No Naked Lights” and “Danger”, and product identification signs, are to be clearly displayed in areas housing chemicals. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks,	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2	3	M	• NEMA, 1998

					drums or containers for contaminated water. • Chemicals are to be properly labelled and handled in a safety conscious manner. • All personnel handling hazardous chemicals and hazardous materials are to be issued with the appropriate Personal Protective Equipment (PPE). • Ensure that diesel/fuel tanks are in a bunded area with capacity of holding 110% of the total storage volume. • The removal of only the daily-required amount of chemicals to be used from the shed. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • Use of drip trays during filling of machinery or equipment. Drip trays should be emptied into secondary containers on a regular basis. • Immediately clean all spillage of fuels, lubricants and other petroleum based products. • The contaminated material must be disposed of in accordance with the waste management procedure. • No hazardous chemical must be discarded in the sewage or stormwater system. • Train staff on the use of chemicals in accordance with the risks as described in the material data sheets. • Soil contaminated with hazardous chemical substances shall be treated as hazardous waste and removed from site.						
Impact Description: Hydrocarbon pollution of soil, surface water and groundwater due to spilling of fuel, grease or oil or leaking equipment and vehicles. Extent of impact: Local Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	3	M	To prevent hydrocarbon pollution of soil, surface water and groundwater.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • All equipment, generators, diesel tanks and vehicles are to be inspected and maintained on a regular basis. • Equipment and vehicles are to be repaired immediately upon developing leaks. • Drip trays shall be supplied for all repair work undertaken on machinery on site. • Drip trays are to be utilised during greasing and re-fuelling of machinery and to contain incidental spills and pollutants. • Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks and drums or containers for contaminated water. • Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and removed from site. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2	2	L	• NEMA, 1998

					funnels. Drums may not be tipped to dispense fuel. • All liquid fuels (petrol and diesel) are to be stored in tanks or containers with lids. • Inspect vehicles on entering the facility to ensure vehicles are in sound condition to reduce the risk of oil or diesel spillages. • Diesel storage tanks and bund walls must undergo yearly integrity assessments. • Generators must be stored on concrete floors in bunded areas.						
Impact Description: Soil, surface water and groundwater pollution from the piggery, its wastewater management practices and mortality management. The main constituents of piggery wastewater that need to be considered from an environmental protection perspective include potassium, dissolved solids, sodium, ammoniacal compounds, organic matter, phosphorous and nitrogen from urine and faeces. The wastewater generally has elevated levels of volatile organic solids, nutrients and possibly salts and can also contain disinfectants used to wash the houses, veterinary chemicals and metals such as copper and zinc. The organic components are readily biodegradable (ARMCANZ/ANZECC, 1999). Toxic compounds in the wastewater sludge, such as heavy metals and pathogens, can, however, also be detrimental to the environment. The proposed management of the piggery wastewater will entail canals to relay wastewater to an existing biodigester. Extent of impact: Local Duration of impact: Lasting during the operational phase.	3	4	H	To ensure responsible management of the piggery wastewater and to prevent the pollution of soil, surface water and groundwater.	Degree to which the impact can be reversed: Impact can be minimised and is largely reversible with human intervention, if preventative and/or immediate action is taken. Once in the system it may take many years to recover. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • The wastewater should be classified in terms of the South African Wastewater Sludge Classification System. • The Pollutant, Microbial and Stability Classes of the wastewater should be established. • The wastewater irrigation handling system must regularly be maintained and inspected to ensure that it is in working condition. This will prevent the development of leaks. • Spillages must be prevented. • Avoid excessive build-up of manure within the houses and below the floor area. • Mortalities must be stored in enclosed areas prior to being taken to the crocodile farm. A vulture restaurant can also be considered, based on the prescribed guidelines. • It must be ensured that the capacity of the biodigester is not exceeded. • The biodigester must be well managed and monitored.	During the operational phase.	• Facility Manager • ECO	2	3	M	• NEMA, 1998 • NWA, 1998
Impact Description: Soil, surface water and groundwater pollution due to the contamination of clean stormwater runoff. Extent of impact: Local Duration of impact: Lasting during the operational phase.	3	3	M	To ensure effective management of stormwater and the prevention of contamination of stormwater runoff.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Stormwater should be diverted away from piggery houses. • No stormwater should be allowed to reach the mortality holding area or wastewater handling system. • The wastewater handling system should be regularly maintained to prevent spillages of wastewater. • The composting area should be bunded and a collection pit/sump should be installed to contain any runoff from the composting area.	During the operational phase.	• Site Manager	2	2	L	• NEMA, 1998 • NWA, 1998
Impact Description: Soil, surface water and groundwater pollution due to the incorrect management of wastewater on site. Nuisance caused by the management of the wastewater. Extent of impact: Local	3	4	H	To prevent soil, surface and groundwater pollution and nuisance as a result of poor management of the wastewater.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • No incineration of any kind of waste will be permitted onsite. • Implement a surface- and groundwater monitoring programme.	During the operational phase.	• Site Manager	2	3	M	• NEMA, 1998 • OHSA, 1993

Duration of impact: Lasting during the operational phase.											

8.4.1.6 Vegetation

Table 38: Environmental Impact Assessment: Vegetation

Activity:

- The removal of surface vegetation and movement of heavy machinery.
- Construction activities in the area where plants of conservation concern occur. Maintenance and edge effects in the operational phase, could trample on these plants if they are present.
- Disturbance and stockpiling of soil. Movement of construction vehicles and equipment.
- Construction and operational activities associated with the piggery.

Aspect:

- **Exposure of soil to erosion and soil compaction.**
- **Removal or destruction of plants of conservation concern.**
- **Spread of alien invasive plant species through contaminated soil or the movement of construction vehicles and equipment.**
- **Degradation of adjacent secondary bushveld and sandy bushveld.**

Nature and significance of environmental impact

Impact Description	Risk rating (before mitigation)			Environmental Objective	Management / Mitigation / Monitoring Measures	Timeframe	Responsibility	Risk rating (after mitigation)			Applicable legislation / other documents
	Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Project Phase Applicability – Construction: X; Operation: X; Decommissioning:											
Impact description: The removal of vegetation will expose the soils, and potentially lead to soil erosion. In addition, indigenous vegetation communities are unlikely to colonise eroded soils successfully. The movement of heavy machinery could result in soil compaction that will modify habitats, destroy vegetation and inhibit re-vegetation. Soil compaction as a result of vehicles and traffic, could lead to a decrease of water infiltration and an increase of water runoff. Extent of impact: Local Duration of impact: Lasting during construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	2	M	To prevent soil erosion and soil compaction.	Degree to which the impact can be reversed: Reversible with human intervention, if immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. • Protect all areas susceptible to erosion (especially stockpiled soils and materials such as sand and tar) and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Do not allow erosion to develop on a large scale before taking action. • Make use of existing roads and tracks where feasible, rather than creating new routes through bushveld areas. • A temporary fence or demarcation must be erected around the construction area (include the servitude, construction camps, areas where material is stored and the actual footprint of the development) to prevent access to sensitive environs. • Vehicles may not veer from the dedicated roads. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005).	During the construction and operational phases	• Construction contractors and workers • Facility manager • ECO	2	2	L	• NEMA, 1998 • DWAF, 2005

					• Once construction is complete, obsolete roads should be obliterated by breaking the surface crust and erecting earth embankments to prevent erosion, while the natural species composition should be re-established. • Colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction.						
Impact description: Although no threatened or protected plant species were recorded there is a possibility that some of these plants may occur particularly in the *B africana-T rehmanni* sandy bushveld. Edge effects or pollution may impact on suitable habitat (the moist grasslands) of threatened species. Extent of impact: Local Duration of impact: Lasting during construction phase and a possibility of extending into the operational phase and for the duration thereof.	3	2	M	To avoid impact on suitable habitat of threatened/protected species.	Degree to which impact can be reversed: If habitat is disturbed, the impact may become irreversible. Mitigation: • At the time of this assessment, no protected or threatened plant species were recorded within either of the two sites. However, site 2 is more likely to harbour these species than site 1 and therefore site 1 should be utilised for the proposed piggery. • However, if any geophytes (or bulbous species) are unearthed during construction, these should be relocated (with assistance or advice from a botanist/ecologist/horticulturist) to similar habitat outside of the development footprint. Any other species deemed to be of concern must be photographed and identified by a botanist/ecologist. • The development layout should avoid the removal of any marula trees. • Maintenance to the piggery or associated activities should be restricted to the previously disturbed footprint of construction and avoid edge effects into the sandy bushveld.	Prior and during the construction and operational phases.	• Planning team • Facility manager	2	1	L	• NEMA, 1998 • NEMBA, 2004
Impact description: Spread of alien invasive plant species from the transformed areas to the natural vegetation, which will result in the deterioration of the natural bushveld vegetation. Extent of impact: Local Duration of impact: Lasting during construction phase.	3	2	M	To remove alien invasive plant species from the site and immediate surrounds and monitor re-emergence.	Degree to which impact can be reversed: Reversible with human intervention, if immediate action is taken. Mitigation: • Alien invasive species, that were identified within the study area should be removed (prioritizing category 1 species), prior to the construction. Be removing these species, the spread of seeds into disturbed soils will be prevented which could thus have a positive impact on the surrounding natural vegetation. • All alien seedlings and saplings must be removed as they become evident for the duration of construction. • Manual / mechanical removal is preferred to chemical control. • All construction vehicles and equipment, as well as construction material should be free of soil and plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access to the study area. This should be verified by the ECO.	During the construction phase.	• Construction contractors and workers • Facility manager • ECO	2	2	L	• NEMA, 1998
Impact description: Edge effects from the construction and operational area could degrade secondary bushveld or sandy bushveld vegetation outside the development footprint.	3	2	M	To limit impact on adjacent vegetation during construction and operation to maintain	Degree to which impact can be reversed: Reversible with human intervention, if immediate action is taken. Mitigation:	During the construction and operational phases.	• Construction contractors and workers • Facility manager	2	1	L	• NEMA, 1998

In addition, fire will likely be excluded from the landscape and the altered fire regime could impact on the natural bushveld processes and therefore lead to degradation thereof. Operational vehicles driving within bushveld, not impacted on during the construction, will lead to the destruction of naturally occurring vegetation and compaction of soils and subsequent erosion or colonisation by alien invasive plant species. Extent of impact: Local Duration of impact: Life of development.				functioning vegetation cover.	• Construction activities must be restricted to the development footprint and no access or impacts to the surrounding vegetation should be allowed. • Ensure that maintenance work does not take place haphazardly, but according to fixed plan. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • Operational or maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to. • After construction, the land must be cleared or rubbish, surplus materials and equipment, and all parts of the land must be left in a condition as close as possible to that prior to construction. • Allow natural fires to burn across the vegetation, except if infrastructure and lives are threatened. • Delay the re-introduction of livestock to all rehabilitation areas until an acceptable level of re-vegetation has been reached. • Ensure that no operational activities impact on naturally vegetated areas outside the development footprint.						

8.4.1.7 Fauna

Table 39: Environmental Impact Assessment: Fauna

Activity: • Construction and operation of the wean-to-finish unit.											
Aspect: • **Loss of wooded bushveld habitats.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	X											
	Operation	X											
	Decommissioning												
Impact description: Damage to mature wooded Central Sandy Bushveld. The development will effectively transform about 2ha of bushveld on the 240ha site, but this could be exceeded if measures are not taken to restrict the construction operations to within what will be the final footprints of the development's components, including the water/waste pipeline. Extent of impact: The impact should be confined to where the			4	2	M	To minimise destruction and disturbance of natural bushveld.	Degree to which impact can be reversed: The impact of the planned extent of the various piggery units cannot be reversed. However, with planning and care, any unnecessary damage to the surrounding bushveld can be reduced, rehabilitated and/or avoided. Mitigation: • Design and construction of minimum length and width of access routes. • Demarcation of intended footprints and organisation of all successive	During construction and operational phases.	• Construction contractors and workers • Facility manager • ECO	3	2	M	• NEMA, 1998

structures and infrastructure will be erected and to the access and delivery routes. Incidental edge effects of disturbance from the development, such as movement, noise, odour and/or lighting, will have a lesser effect outside of the development footprint. In the bushveld habitat, light pollution will have the effect of attracting insects and their predators out of the cover and protection of the woodlands. Duration of impact: The impact is considered to be permanent, throughout the construction and operation of the piggery.					activities within the available footprints. • Proper estimation and control of rainwater runoff from the site and its access roads, with the assumption that wastewater generated on site is already addressed by its own facility. • Provision of temporary staff shelter and ablution facilities within these footprints. • Care with materials used and any spills occurring within these footprints to prevent surrounding contamination. • Disposal of waste from these footprints to appropriate off-site facilities. • No extra tracks, material dumps or staff activities should take place anywhere in the area surrounding the construction site. • Any fauna attracted to the development to be chased back or captured and returned to the surrounding bushveld. • Direct any lighting on and around the sites away from the surrounding bushveld. Fluorescent and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible. • Offset bushveld loss by improved management of remaining bushveld on and around the site, by control of invasive exotic plants, in particular *Lantata* and *Jacaranda*. Degree to which impact can be reversed: Irreversible with human intervention on the development sites, but effects partly reversible by offsets if protection and improvement of remaining bushveld can be implemented.						

8.4.1.8 Heritage and Palaeontology

Table 40: Environmental Impact Assessment: Heritage and Palaeontology

Activity: • Construction and operation of the wean-to-finish unit.											
Aspect: • **Disturbance of artefacts or sites of cultural heritage (archaeological and historical) significance.** • **Disturbance of fossils and bedrock of Palaeontological sensitivity.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	X											
	Operation	X											
	Decommissioning												
Impact description: Construction activities may disturb or destroy sites, features or artefacts of archaeological and/or historical importance. No sites, features or artifacts of significant cultural and			1	3	L	To protect artefacts or sites of cultural heritage (archaeological and historical) significance.	Degree to which impact can be reversed: Preventable with human intervention, if immediate action is taken in the event that any sites or artifacts of heritage significance is found. Mitigation:	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	1	2	L	• NEMA, 1998 • NHRA, 1999

heritage importance have been found on site. From a heritage point of view, the development should be allowed to continue, taking the necessary mitigation measures into account. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase. Destruction of any sites or artifacts of heritage significance will be permanent.					• If during any construction or operational activities, any site, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be halted until the situation has been resolved.						
Impact description: Construction activities may disturb or destroy fossils or bedrock of palaeontological sensitivity. It is unlikely that any fossils will be observed as the site is covered by deep sandy soils. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase. Destruction of any sites of palaeontological significance will be permanent.	2	2	L	To protect fossils and features of palaeontological significance.	Degree to which impact can be reversed: Preventable with human intervention, if immediate action is taken in the event that any sites of palaeontological significance is found. Mitigation: • The EAP as well as the ECO for this project must be made aware of the fact that the Clarens Formation sediments is Highly significant for fossil remains of vertebrates, including the dinosaurs. • If bedrock will be exposed during excavations for foundations, a qualified palaeontologist must be appointed to inspect the excavations for the presence of fossils. If excavations will not expose bedrock, no further mitigation for palaeontological heritage is recommended. • These recommendations should form part of the EMP of the project.	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	1	2	L	• NEMA, 1998 • NHRA, 1999

8.4.1.9 Sensitive Landscapes – Wetlands

Table 41: Environmental Impact Assessment: Sensitive Landscapes – Wetlands

Activity: • The moving of soil, vegetation and building materials. • Construction and operational activities associated with the piggery.											
Aspect: • **Introduction and spread of exotic vegetation.** • **Changes in water quality due to toxic contaminants and increased nutrient levels.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	
Project Phase Applicability	**Construction**	**X**											
	Operation	**X**											
	Decommissioning												
Impact description: Invasions of alien plants can impact on hydrology by reducing the quantity of water entering a wetland and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system, alien invasive plants			2	2	L	To prevent the introduction and spread of invasive alien plants.	Degree to which impact can be reversed: Once in the system it may take many years to recover. Proposed mitigation:	During the construction, operational phases.	• Construction contractor • Facility Manager • ECO	1	1	L	• NEMA, 1998

can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users. Exotic vegetation could come from proposed feed for the pigs. Extent of impact: Regional Duration of impact: Lasting during the construction phase and the operational phase.					• Ensure proposed feed does not contain exotic vegetation or seeds. • Weed control. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area and returning it where possible afterwards. • Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. • Rehabilitate or revegetate disturbed areas.						
Impact description: Operational activities will result in the discharge of solvents and other industrial chemicals, leakage of fuel/oil from vehicles and the disposal of sewage resulting in the loss of sensitive biota in the wetlands and a reduction in wetland function as well as human and animal waste. Could possibly impact on groundwater. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	3	M	To prevent changes in water quality and subsequent loss of ecological function of wetland.	Degree to which impact can be reversed: Once in the system it may take many years for some toxins to be eradicated. Proposed Mitigation: • Provision of adequate sanitation facilities located outside of the watercourse/riparian area or its associated buffer zone. • Implementation of appropriate stormwater management around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated runoff into the watercourse. • After construction, the land must be cleared of rubbish, surplus materials and equipment and all parts of the land shall be left in a condition as close as possible to that prior to use. • Maintenance of construction vehicles/equipment should not take place within the wetland or wetland buffer. • Ensure that no operational activities impact on the wetland or buffer area. This includes edge effects. • Control waste discharges and do not allow dirty water from operational activities to enter the watercourse. • Regular independent water quality monitoring should form part of operational procedures in order to identify pollution. • Treatment of pollution identified should be prioritised accordingly.	During the construction, operational phases.	• Construction contractor • Facility Manager • ECO	3	2	M	• NEMA, 1998

8.4.1.10 Biosecurity

Table 42: Environmental Impact Assessment: Biosecurity

Activity:											
• Operation of the piggery.											
Aspect: • **The attraction of flies, mice and rats to the piggery.** • **The use of vaccines at the piggery.** • **Pedestrian and vehicular access to the site.** • **Outbreak of diseases at the piggery.**											
Nature and significance of environmental impact											
Impact Description	**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**			**Applicable legislation / other documents**
	Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**	

Project Phase Applicability													
	Construction												
	Operation	X											
	Decommissioning												
Impact description: Flies, mice and rats can carry infectious vectors that are detrimental to the health of pigs. Flies are attracted to moist and decaying organic matter. A risk exists of fly populations increasing in the vicinity of the piggery. Extent of impact: Local Duration of impact: Lasting during the operational phase.	3	3	M	To prevent the attraction of flies to the piggery and the harbouring of pests such as mice and rats.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • Mortalities must be removed from the houses on a daily basis. • The feed storage and distribution systems must be designed and maintained in a manner that deters the presence and breeding of vermin. • Attention to effective sanitation at the piggery will minimise the area where flies can rest and breed. • Regular flushing of the wastewater from the houses will minimise fly breeding. • Regularly clean the feeding areas and collect wasted feed. This will prevent the attraction of flies to the piggery.	During the operational phase.	• Facility Manager	2	2	L	• NEMA, 1998
Impact description: Potential injury to employees working with biological waste. Biological or bio-hazard waste includes syringes for vaccines. Extent of impact: Local Duration of impact: Lasting during the operational phase.	2	3	M	To ensure the correct management of biological waste.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. Mitigation: • The collection and disposal of biological waste must be conducted in a responsible manner, in conjunction with a consulting veterinarian. • Recognised safe storage equipment/containers must be used for the collection of this waste. • Awareness must be created amongst employees on the safe placing of this material into the designated containers.	During the operational phase.	• Facility Manager	1	2	L	• NEMA, 1998 • OHSA, 1993
Impact description: Unauthorised access to the site, via foot or vehicles, as well as the entry of other animals into the biosecurity zone of the piggery can compromise its biosecurity buffer. Extent of impact: Local Duration of impact: Lasting during the operational phase.	2	3	M	To ensure that there is no unauthorised access to the site.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. Mitigation: • A security fence must be erected around the piggery. • Access to the piggery must be controlled via one access point. • Access to the property itself must also be controlled. • Entrance gates must be manned during operational hours and locked outside of operational hours. • Access to the premises should only be by prior arrangement. • The condition of the fence around the piggery must be inspected every six months.	During the operational phase.	• Facility Manager	1	2	L	• NEMA, 1998
Impact description: Death of pigs at the piggery, including mass mortalities and the potential spread of the disease to other farms. Extent of impact: Local Duration of impact: Lasting during the operational phase.	3	4	H	To ensure that any outbreak of disease is contained and does not spread to neighbouring farms or further afield.	Degree to which the impact can be reversed: If the spread of disease is allowed to proceed, the impact may become irreversible. Mitigation: • Should there be an outbreak of disease at the piggery, the cause or source of the disease should be identified as soon as possible, in consultation with a veterinarian. • Neighbouring landowners should be informed of the outbreak.	During the operational phase.	• Facility Manager	2	3	M	• NEMA, 1998

					• The diseased animals should be separated/isolated and treated (when possible). • Inform the relevant state department of the outbreak. • Emergency plans/procedures must be developed to deal with outbreaks of diseases. • Mass mortalities must be managed in a responsible manner, in consultation with a veterinarian. • Bait stations should be used for rodent control and can also be used for fly control. • Bait stations must be placed where they cannot be reached by the pigs. They must be placed where rodents and flies are active and should have sufficient levels of bait. • An owl box programme could be considered as an alternative rodent control initiative.						

8.4.1.11 Resource Usage

Table 43: Environmental Impact Assessment: Resource Usage

Activity:											
• Usage of resources, such as electricity and water.											
Aspect:											
• **Inefficient and redundant use of valuable resources (electricity and water).**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**	**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability** / **Magnitude** / **Severity**	
Project Phase Applicability	**Construction**	X									
	Operation	X									
	Decommissioning										
Impact description: Wastage or depletion of valuable resources (electricity and groundwater) due to inefficient or redundant usage. Extent of impact: Local Duration of impact: Lasting during the operational phase.			3	3	M	To prevent the wastage or depletion of valuable resources (electricity and groundwater).	**General** • Ensure that all employees have been informed of the importance of natural resources (proper environmental training and awareness). • Regular site inspection by supervisors should be conducted. • Inspect operations regularly to determine areas of improvement with regards to resource consumption. • Regular maintenance and inspection of equipment such as hose pipes to prevent leaks. • Monitor resource consumption. • Identify areas where resource consumption can be minimised. • Set targets to minimise resource consumption. • Identify and implement technologies and practices that may reduce resource consumption. **Water** • Regular inspection and maintenance of all boreholes, tanks, reservoirs,	During the construction and operational phases.	• Construction contractor • Facility Manager • ECO	2 / 2 / L	• NEMA, 1998

					toilets, water pipes, valves and taps should be conducted. • Leaking tanks, reservoirs, taps, toilets and pipes must be repaired immediately. • Running water taps and pipes may not be left unattended. • All pipe, hose and tap connections are to be fitted with correct and appropriate plumbing fittings. • The quantity of groundwater abstracted on a daily basis must be metered or gauged. Records must be kept of all abstractions. • The recommended groundwater abstraction rates should be adhered to, to ensure sustainable use of the resource. • It is advised that water level monitoring is conducted on the boreholes used for the piggery as well as any surrounding boreholes. • All measuring devices must be properly maintained, must be in good working order and must be easily accessible. This shall include a programme of checking, calibration and/or renewal of measuring devices. • It is recommended that infrastructure is installed to collect rainwater to be used at the piggery. **Electricity** • Save electricity by turning off lights and computers when not in use. • Energy saving light bulbs should be used. • The flow of wastewater through the wastewater irrigation handling system should be by gravity flow, rather than pumps, as far as possible. • The use of alternative energy can be implemented by the installation of solar panels or the use of methane from the biodigester as an alternative fuel source.						

8.4.1.12 Infrastructure

Table 44: Environmental Impact Assessment: Infrastructure

Activity:											
• Increased traffic frequency on road infrastructure during construction activities. • Increased traffic on road infrastructure during operation of the piggery (loading and offloading of pigs and feed).											
Aspect:											
• **Wear of access roads and insufficient vehicle inspections.** • **Visibility of the piggery to adjacent land owners and passing motorists on the N1 highway.**											
Nature and significance of environmental impact											
Impact Description			**Risk rating (before mitigation)**			**Environmental Objective**	**Management / Mitigation / Monitoring Measures**	**Timeframe**	**Responsibility**	**Risk rating (after mitigation)**				**Applicable legislation / other documents**
			Probability	**Magnitude**	**Severity**					**Probability**	**Magnitude**	**Severity**		
Project Phase Applicability	**Construction**	**X**												
	Operation	**X**												
	Decommissioning													

Impact description: Wear of access roads, accidents on access roads, unpermitted transport of pigs and loss of pigs being transported on access roads. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	3	M	To minimise the impact of the increase in traffic on access roads to the site.	Degree to which the impact can be reversed: Reversible with human intervention, if preventative and/or immediate action is taken. Mitigation: • Ensure that all construction vehicles using access roads are roadworthy. • All loads are to be securely fastened when being transported. • All vehicles are to adhere to the tonnage limitation and acquire a permit as required. • All speed limits and other traffic regulations on the roadways must be adhered to. • Safety signage should be erected along the construction site.	During the construction and operational phase.	• Construction contractor • Facility Manager • ECO	1	2	L	• NEMA, 1998
Impact description: Visual impact upon receptors surrounding the piggery, including adjacent land owners and passing motorists. Extent of impact: Local Duration of impact: Lasting during the construction phase and the operational phase.	3	3	M	To minimise the visual impact of the piggery on receptors in the vicinity of the site.	Degree to which the impact can be reversed: Impact can be minimised human intervention. Mitigation: • If the piggery is still visible through the trees present on site, additional trees should be planted around the periphery of the piggery, outside of the piggery fence, to reduce the visibility of the piggery to receptors in the vicinity of the piggery. • Directional lighting can be used at the piggery, but must be directed inwards (towards the piggery) and not outwards towards the neighbouring properties and the nearby roads. • No high floodlights may be erected at the piggery.	During the construction and operational phase.	• Construction contractor • Facility Manager • ECO	2	2	L	• NEMA, 1998

8.4.2 Cumulative Impacts

Cumulative impacts refer to the situation where an activity may in itself not have a significant impact, but may become significant when added to the existing and potential impacts from similar or different activities in the area. The following potential cumulative impacts have been identified:

Table 45: Cumulative impacts

Impact: Generation of noise and dust as well as an increase in traffic	
Contributing aspects	Noise and dust generated at the piggery will combine with existing sources of noise and dust in the area, such as vehicles travelling on the nearby roads (N1 highway) and agricultural activities, including an existing piggery on the property and in its vicinity.
Impact: Generation of Odours	
Contributing aspects	Odours generated at the piggery will contribute to the odours being generated by the existing piggery on site and chicken farms in the surrounding area.
Impact: Abstraction of Groundwater	
Contributing aspects	The abstraction of groundwater will add to existing groundwater abstraction on the property for domestic use and livestock watering.
Impact: Generation of Wastewater	
Contributing aspects	The generation of wastewater will add to the existing generation of wastewater to be treated in the biodigester.
Impact: Gas Flaring	
Contributing aspects	The increased wastewater treated with the biodigester will increase the amount of gas to be burned.

8.4.3 Residual Impacts

As the proposed wean-to-finish unit development will be permanent and closure of the pig farm is not foreseen, no residual impacts have been identified for this project.

8.5 Conclusion on impacts identified

In general, the expected environmental impacts from the construction and operation of the wean-to-finish unit and associated infrastructure do not indicate that the proposed activities would have irreversible detrimental effects on the receiving environment provided that mitigation measures are implemented.

Part 6 of this report contains a detailed investigation and assessment of the alternative options for the development of the wean-to-finish unit. The positive and negative implications of each alternative are discussed under Section 9.2 of this report.

8.6 Processes to be undertaken to ensure that impacts are mitigated

Mitigation measures need to be identified to ensure that impacts from the proposed activity are reduced as far as possible. The following mitigation measures objectives will be kept in mind while mitigation measures are identified:

- To find more environmentally sound ways of undertaking specific activities;
- To enhance any environmental and social benefits of a proposed activity;
- To avoid, minimise or remedy negative environmental impacts; and
- To ensure that any residual negative environmental impacts are environmentally acceptable.

Identifying appropriate mitigation measures will be conducted in a hierarchal manner:

1. Preventative measures will be identified to avoid, where possible, negative impacts that may arise as a result of the proposed activity;
2. Measures will be identified to minimise and/or reduce the negative impacts to “as low as practicable” levels; and
3. Measures will be identified to compensate or remedy residual negative impacts that are unavoidable and cannot be minimised or reduced any further (Department of Environmental Affairs, 2006).

Proposed mitigation measures will be communicated to the applicant for review as part of the Environmental Management Programme report (EMPr). The applicant will comment on the feasibility and practicality of implementing the mitigation measures. The mitigation measures may be adjusted based on the applicant’s comments.

8.7 Summary of the findings and impact management measures identified by specialists

Refer to the table below for a summary of the findings of the specialists and proposed mitigation measures.

Table 46: Summary of findings by specialists

Summary of Findings	Mitigation Measures
Heritage	
Construction activities may disturb or destroy site, features or artefacts of archaeological and/or historical importance. No artefacts of archaeological significance were found on site.	• If, during any construction or operational activities, any site, features and objects of a cultural heritage (archaeological or historical) nature are exposed, an expert should be called in to investigate and suitable mitigation measures must be implemented. All activities in the area should be ceased until the situation has been resolved.

Summary of Findings	Mitigation Measures
	• No further mitigation measures were identified.
Palaeontological	
The site is underlain by the Clarens formation which is known for the presence of vertebrate fossil remains. The site is, however, covered with deep sandy soils, and it is unlikely that any fossils will be found. Construction activities may expose bedrock that may contain fossils.	• If, during any construction or operational activities, any bedrock is exposed, a qualified palaeontologist must be appointed to inspect excavations for the presence of fossils. • No further mitigation measures were identified.
Vegetation	
Alternative 1 is preferred over alternative 2 for the construction of the piggery, as it is considered to be of lower sensitivity.	• Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks. • All alien seedlings and saplings must be removed as they become evident for the duration of construction. • Construction activities must be restricted to the development
Fauna	
There is no concern for any threatened vertebrate species, even though the impact of the proposed development will be somewhat different for each group of vertebrates.	• No extra tracks, material dumps or staff activities should take place anywhere in the area surrounding the construction site. • Disposal of waste from the construction site to appropriate off-site facilities. • Any fauna attracted to the development to be chased back or captured and returned to the surrounding bushveld. • Offset bushveld loss by improved management of remaining bushveld on and around the site, by control of invasive exotic plants, in particular *Lantata* and *Jacaranda*.
Sensitive Landscapes – Wetlands	
No wetlands were recorded on any of the two proposed site alternatives. A wetland area was, however, recorded north of the northern site. This wetland is however farther than 500 metres from the site and is unlikely to be impacted by the proposed development.	• Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction/earthworks in that area and returning it where possible afterwards. • Rehabilitate or revegetate disturbed areas. • Effluent ponds should be considered to avoid manure contaminating groundwater. • Implement appropriate stormwater management

Summary of Findings	Mitigation Measures
	around the excavation to prevent the ingress of run-off into the excavation and to prevent contaminated run-off into the watercourse. • Ensure that no operational activities impact on the watercourse or buffer area. This include edge effects. • Regular independent water quality monitoring should form part of operational procedures in order to identify pollution. • Treatment of pollution identified should be prioritised accordingly.

9. ENVIRONMENTAL STATEMENT

9.1 A summary of the key findings of the environmental impact assessment

This application for Environmental Authorisation in terms of the National Environmental Management Act, 1998, as amended, has been initiated to allow development of the Humphries Boerdery Wean-to-Finish Unit.

The above mentioned authorisation will ensure legally compliant operation of the piggery in terms of the relevant environmental legislation in South Africa.

The following main negative impacts may arise from the proposed activity:

- Soil, surface water and groundwater pollution;
- Erosion that may lead to destruction of natural habitats and sedimentation of proximate wetlands;
- Invasion of alien invasive plants;
- Generation of odorous emissions and nuisance conditions; and
- Breach in biosecurity at the piggery.

9.2 A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives

Part 6 of this report contains a detailed investigation and assessment of the alternative options for the wean-to-finish unit. The positive and negative implications of each alternative are also described in the table below. A comparison is done below to assess the positive and negative implications of the proposed activities compared to the no-go alternative. This should provide a fundamental consideration of the feasibility of the project.

Table 47: Comparison of the proposed preferred activities and the no-go option

	Development Option	**No-go Option**
Positive Impacts	• Creation of temporary and permanent job opportunities during the construction and operational phases of the proposed development. • Stimulation of the local and regional economy. • Related industries, such as those that will form part of the supply chain for the piggery, will be stimulated from an	• No disturbance of vegetation. • No generation of dust, noise, odour or other nuisance conditions. • Risk of soil, surface water and groundwater pollution is not increased.

	economic point of view. • Positive contribution towards food safety in South Africa. • Development of infrastructure in the area. • The piggery is in line with the local socio-economic initiatives, including the Bela-Bela Local Municipality's Spatial Development Framework, where the stimulation of the agricultural sector is identified as a priority area. • The piggery is in line with the Environmental Management Framework for the Waterberg District Municipality, where the development of the agricultural sector is emphasised. This includes the Waterberg Agriculture Training Programme.	
Negative Impacts	• Disturbance of indigenous vegetation (secondary in nature and of low sensitivity). • Generation of dust, noise odour or other nuisance conditions. • Increased risk of soil, surface water and groundwater pollution.	• No creation of new job opportunities. • No stimulation of local and regional economy. • No new contribution towards food safety in South Africa. • No new development of infrastructure in the area. • No contribution towards fulfilling the objectives of the Bela-Bela Local Municipality's Spatial Development Framework. • No contribution towards fulfilling the objectives of the Environmental Management Framework for the Waterberg District Municipality.

As shown in the table above, the No-go option has a number of positive impacts on the environment, but has a greater number of negative impacts, especially from a socio-economic perspective. Even though the Development option has a number of negative impacts, it is surpassed by the number of positive impacts. The development option is therefore the preferred option.

9.3 Post construction monitoring requirements

The following post-construction monitoring requirements were identified:

- Monitoring the implementation of the Environmental Authorisation conditions and EMP recommendations for the proposed wean-to-finish unit;
- Monitoring the establishment of alien invasive plants;
- Monitoring rehabilitation of disturbed areas (construction areas);
- Monitoring wastewater quality and quantity; and
- Monitoring groundwater and surface water quality and quantity.

9.4 Financial provisions for rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts

As the proposed wean-to-finish unit development will be permanent and closure of the pig farm is not foreseen, no financial provision was made for rehabilitation. Closure and ongoing post-decommissioning management of negative environmental impacts are not applicable.

Humphries Boerdery is, however, responsible for any pollution, environmental degradation and any consequent adverse health effects in terms of Section 2(4)(p) of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

10. CONCLUSION

Information has been provided to the Limpopo Department of Economic Development, Environment and Tourism and Interested and Affected Parties during the Basic Assessment Process. Comments and concerns were received and integrated into the Basic Assessment Report. This document serves as the draft report to be considered by the registered I&APs and state departments. Should there be any comments received on this report within the notice period provided, these comments will be addressed in the final report that will be submitted to the competent authority, the Limpopo Department of Economic Development, Environment and Tourism for final perusal.

This basic assessment process has been carried out in accordance with the NEMA and the Regulations there under.

Anticipated significant impacts

The positive and negative impacts of all the alternatives have been identified and assessed under Section 6 of this report. The identified impacts and/or environmental risks as result of the proposed wean-to-finish unit are mostly **Medium**. Appropriate mitigation measures will assist in minimising the potential impacts on the surrounding environment during the construction and operational phases of the development. The identified impacts can be mitigated to mostly **Low**, provided that the draft Environmental Management Programme, containing the proposed mitigation measures, is implemented. It is further important that the EMP must be viewed as a dynamic, working document that will be improved upon, as and when required.

Positive impacts from the proposed project include the creation of employment opportunities, contributing to food safety in South Africa as well as stimulation of local, district and provincial economies.

Assumptions

The following assumption are made:

1. That the information provided by the applicant regarding the proposed project is correct.
2. That the mitigation measures proposed in this report and the draft Environmental Management Programme are implemented correctly and are effective.
3. All specialist opinions are accurate.
4. All research/reference sources are accurate.
5. That there will be no significant changes to the proposed project that could affect the findings and recommendations of this report and the draft Environmental Management Programme.

Uncertainties

No uncertainties have been identified.

Knowledge gaps

It is believed that no knowledge gaps exist in terms of the proposed project, the current state of the environment as well as the potential impacts associated with the proposed project.

Way forward

Based on the outcomes of the Environmental Impact Assessment, conducted as part of this Basic Assessment Process, the following recommendations are made:

1. **The proposed project (the construction of the Humphries Boerdery Wean-to-Finish Site) should be authorised and allowed to proceed.**
2. The mitigation measures proposed in this report and the draft Environmental Management Programme must be implemented during all phases of the proposed project.
3. A communications pathway must be established that would allow the designated ECO to accept and deal with stakeholder complaints.
4. Proposed mitigation measures should be incorporated as far as possible into the operational plan for the piggery unit.
5. Strict monitoring and enforcement of requirements of the EMP must be undertaken to ensure that contractors and operators adhere to these requirements.