

DRAFT BASIC ASSESSMENT REPORT

JULY 2021



Proposed Development of the Greenies Farms Aquaponics

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Geographical Information Systems
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A programme by
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DOCUMENT DESCRIPTION

Applicant: Greenies Farms (Pty) Ltd
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Report details: The purpose of this Draft Basic Assessment Report is to:

Present the proposed project and the need for the project;

- Describe the study area environment with respect to the proposed development to ensure an extensive amount of information for commenting purposes and eventually decision-making
- Provision of an overview of the BA Process being followed, including public consultation;
- Assessment of the anticipated positive and negative impacts of the proposed development on the receiving environment;
- Provision of recommendations with the aim of avoiding or mitigating negative impacts whilst enhancing the positive benefits of the project;
- Provision of an Environmental Management Programme (EMPr) for the proposed project.

This Draft Basic Assessment Report is being made available to all Interested and Affected Parties (I&APs) and stakeholders for a 30-day review period. All comments submitted during the review of the BA Report will be incorporated into the finalised Basic Assessment Report as applicable and where necessary. The finalised BA Report will then be submitted to the North West Department of Economic Development, Environment, Conversation and Tourism for decision-making.

DOCUMENT CONTROL

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Date: July 2021	Date: July 2021	Date:

PUBLIC PARTICIPATION DETAILS

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EXECUTIVE SUMMARY

Introduction and background

Greenies Farm aims to establish an agri-business through the development of aquaponics (a combination of aquaculture and hydroponics). Production will be based on Recirculating Aquaculture System (RAS). The facility will grow 100tons of Nile Tilapia and estimated 600tons of vegetables in addition to poultry and a piggery as future plans.

Basic Assessment Process

Information Decision Systems has been appointed by the National Department of Forestry, Fisheries and the Environment (DFFE), runs the Special Needs and Skills Development Programme which is aimed at providing Environmental Services, pro-bono, to small-scale businesses. The programme offers the undertaking of a Basic Assessment for projects that require this assistance in applying for Environmental Authorisation.

The proposed development triggers listed activities in terms GNR 327 and 324 of the EIA Regulations 2014 as amended (see summary table below) as such a Basic Assessment process is followed.

Relevant Government Notice	Activity No (s) (relevant notice): e.g., Listing notices 1, 2 or 3	Description of listed activity as per the wording in the listing notice
R327	Listing Notice 1: Activity 3 (iii)	The development and related operation of facilities or infrastructure for the slaughter of animals with a — (i) product throughput of poultry exceeding 50 poultry per day (iii) wet weight product throughput of fish, crustaceans or amphibians exceeding 20 000 kg per annum.
R327	Listing Notice 1: Activity 5 (iii)	The development and related operation of facilities or infrastructure for the concentration of— more than 25 000 chicks younger than 20 days per facility situated outside an urban area
R327	Listing Notice 1: Activity 6 (i)	The development and related operation of facilities, infrastructure or structures for aquaculture of: (i) finfish, crustaceans, reptiles or amphibians, where such facility, infrastructure or structures will have a production output exceeding 20 000 kg per annum (wet weight);
R327	Listing Notice 1: Activity 8	The development and related operation of hatcheries or agriindustrial facilities outside industrial complexes where the development footprint covers an area of 2 000 square metres or more.
R327	Listing Notice 1: Activity 12 (xii) (c)	Infrastructure or structures with a physical footprint of 100 square metres or more; if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse
R327	Listing Notice 1: Activity 19 (i)	The infilling or depositing of any material of more than [5] 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than [5] 10 cubic metres from [—(i)] a watercourse
R327	Listing Notice 1: Activity 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.
R324	Listing Notice 3: Activity 13 (h)(vi)	The development and related operation of facilities of any size for any form of aquaculture. In North West (iv) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.
R324	Listing Notice 3: Activity 12 (e) (ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. In North West (ii) Within critical biodiversity areas identified in bioregional plans
R324	Listing Notice 3: Activity 14 (xii) (ff)	The development of infrastructure or structures with a physical footprint of 10 square metres or more. In North West (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

This draft Basic Assessment Report (DBAR) has been compiled in accordance with the stipulated requirements in GNR 326, Appendix 1 of the EIA Regulations, 2014 (as amended in 2017), which outlines the legislative BA process and requirements



for assessment of outcomes, impacts and residual risks of the proposed development. The DBAR further incorporates the findings and recommendations of the specialist studies conducted for the project.

Public Participation Process

The public participation process commenced in April 2021 whereby the intention to apply for an Environmental Authorisation was sent through the following;

- Notification by email to all stakeholders including authorities and the public
- Placement of site notices
- Distribution of the Background Information Document.
- Advertisement on the Brits Pos dated 1st July 2021.

IDS has since developed an interested and affected parties register to capture information about all parties concerned and interested on the project. In addition, a comments and responses report has been drafted.

Impact Assessment and Mitigation

The BA Report is informed by three specialist studies, an Aquatic and Wetland Assessment, Terrestrial Biodiversity Assessment and a Heritage Impact Assessment, together with inputs sourced by the environmental scientists in the within IDS and competent authorities that have been engaged especially in the Aquaculture field.

The EAP has not identified any negative impacts that could be classified as “fatal flaws”. The main negative impacts of the Greenies Farms Aquaponics project are predicted to be:

- Groundwater monitoring;
- Waste and water management
- Impacts on fauna and flora
- Air emissions
- Soil erosion
- Stormwater management

Whilst the positive impacts have been noted as follows;

- Employment permanent staff of 22 and 24 seasonal workers
- Food security from the production of 100tons per annum of tilapia as well as vegetables, chickens and pigs.

Mitigation actions have been included in the EMPr and detailed within the Draft BAR. The most important mitigation actions are:

- The development of an alien invasive vegetation control and removal plan, which will be implemented during construction and the operational phase of the project;
- A waste management plan for all waste generated during the operational phase of the project must be developed prior to construction taking place;
- Undertaking water quality monitoring (bi-annual) during the operational phase of the project to ensure the waste generated is not affecting nearby water courses and aquatic faunal species;
- The development of a Storm water management plan;
- The development of a Fire management plan; and
- Borehole monitoring on a bi-annual period, for water quality management, during the construction and operational phase.
- Furthermore, alien species such as *Orochromis niloticus* and *Lemnaceae* may not be released into the surrounding watercourses and be kept in secure facility to prevent alien invasion and biodiversity loss.
- The river flow downstream still needs to be maintained of any disturbed areas to ensure the ongoing viability of aquatic macroinvertebrate species in these areas.
- The water quality parameters as mentioned in section 2.1.1 need to be managed and monitored especially the pH and DO. This is done to ensure that the reasonable water quality occurs downstream of the proposed development site. This will allow the ongoing survival of aquatic macroinvertebrate species diversity and reasonable sensitivity.
- Make sure that all the activities that are taking place within the proposed development area take the wetland and riverine boundaries into account. No activities should take place within the riverine and wetland boundaries unless it is unavoidable.



- Based on the depression wetland that was discovered in the site, no activity should take place within the depression and within the 20m buffer from the depression.
- No construction should take place within the 100m buffer from the river as this area is considered as riparian area.
- No infrastructure should be placed within the 32m buffer from any aquatic resources because this area is considered a riparian area.
- Demarcate all the riverine and wetland boundaries.
- No vehicle to drive through or enter the demarcated area except when there is a designated roadway.
- The vehicles should be also restricted from traveling only on the designated roadways in order to limit the ecological footprint of the proposed development activities.
- No dumping or any other materials is allowed within or on the boundary of the wetland and riverine system.
- No activities should take place on the riverine and wetland boundary. If this is unavoidable, a relevant authorisation must be obtained according to the National Environmental Management Act (NEMA) 107 of 1998 and Section 21 c and i of the National Water Act 36 of 1998.
- No dirty water from the runoff should reach the drainage features in the proposed development area and the requirement of regulation GN 704 of the National Water Act (Act 36 of 1998) needs to be clarified and strictly adhered to.

Based on the findings of the Basic Assessment process for Greenies Farm Aquaponics project, it is the opinion of the EAP that the project is authorised on condition that the mitigation measures provided within this report and the EMPr are met and complied with. The EMPr therefore has been identified as an extension of the Environmental Authorisation which the applicant must adhere to. The attention of the applicant is also drawn to the mitigation measures provided by the specialist assessments and the Aquaculture generic model by the DFFE Aquaculture Directorate to ensure financial sustainability of the project.

The project applicant, i.e. Greenies Farms, is being assisted under the DFFE Special Needs Programme on a pro bono basis as the applicant qualifies as having “special needs”, in particular, in that they do not have the financial means to conduct with BA process without financial support. In addition, the applicant has been included within the Operation Phakisa programme which further confirms sustainability. However, the applicant does not have financial resources to consider site alternatives as the process would require due to the land being tribal land.

Due to the site having low impacts following implementation of mitigation measures, it is therefore recommended by the EAPs that the proposed layout and preferred site (this proposal) be included in the Environmental Authorisation (should such authorisation be granted for the proposed project).

Provided that the specified mitigation measures outlined in the EMPr are applied effectively, it is the opinion of the EAP that the benefits of the project outweigh the negative impacts and the project should receive Environmental Authorisation in terms of the EIA Regulations 2014 promulgated under the NEMA.



SUMMARY OF WHERE REQUIREMENTS OF APPENDIX 1 OF THE 2017 NEMA EIA REGULATIONS (GN R 326, AS AMENDED) ARE PROVIDED IN THIS BASIC ASSESSMENT REPORT

Appendix 1 of the Regulations	Yes/No	Section in the Basic Assessment Report
1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a) details of –		
i. the EAP who prepared the report; and	YES	Section 2.7
ii. the expertise of the EAP, including a curriculum vitae;	YES	Appendix I
(b) the location of the activity, including		
i) the 21 digit Surveyor General code of each cadastral land parcel;	YES	Section 3.2
(ii) where available, the physical address and farm name;	YES	Section 3.2
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	YES	Section 3.2
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is-		
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	YES	Section 3.3
(ii) on land where the property has not been defined, the coordinates within which the activity		
(iii) is to be undertaken;		
(d) a description of the scope of the proposed activity, including		
(i) all listed and specified activities triggered and being applied for; and	YES	Section 3.3
(ii) a description of the activities to be undertaken including associated structures and infrastructure ;		



Appendix 1 of the Regulations	Yes/No	Section in the Basic Assessment Report
<p>e) a description of the policy and legislative context within which the development is proposed including-</p> <p>(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and</p> <p>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments</p>	YES	Section 5
<p>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location</p>	YES	Section 3.6
<p>(g) a motivation for the preferred site, activity and technology alternative;</p>	YES	Section 4
<p>(h) a full description of the process followed to reach the proposed preferred alternative within the site, including:</p> <p>(i) details of all the alternatives considered;</p> <p>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;</p> <p>(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;</p> <p>(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-</p> <p>(aa) can be reversed;</p> <p>(bb) may cause irreplaceable loss of resources; and</p>	YES	<p>Section 2</p> <p>Section 4</p> <p>Section 6</p> <p>Section 7</p> <p>Section 8</p>



Appendix 1 of the Regulations	Yes/No	Section in the Basic Assessment Report
<p>(cc) can be avoided, managed or mitigated;</p> <p>(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;</p> <p>(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(viii) the possible mitigation measures that could be applied and level of residual risk;</p> <p>(ix) the outcome of the site selection matrix;</p> <p>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and</p> <p>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;</p>		
<p>(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-</p> <p>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p> <p>(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;</p>	YES	Section 8.1
<p>(j) an assessment of each identified potentially significant impact and risk, including-</p> <p>(i) cumulative impacts;</p> <p>(ii) the nature, significance and consequences of the impact and risk;</p>	YES	Section 8.1



Appendix 1 of the Regulations	Yes/No	Section in the Basic Assessment Report
<p>(iii) the extent and duration of the impact and risk;</p> <p>(iv) the probability of the impact and risk occurring;</p> <p>(v) the degree to which the impact and risk can be reversed;</p> <p>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) the degree to which the impact and risk can be avoided, managed or mitigated;</p>		
<p>(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;</p>	YES	Section 8.3.1
<p>(l) an environmental impact statement which contains-</p> <p>(i) a summary of the key findings of the environmental impact assessment;</p> <p>(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</p> <p>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p>	YES	Section 8.3
<p>(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;</p>	YES	Section 8.3
<p>(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;</p>	YES	Section 8.5
<p>(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;</p>	YES	Section 8.4



Appendix 1 of the Regulations	Yes/No	Section in the Basic Assessment Report
(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;	YES	Section 8.5
(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;	YES	Section 8.5
<p>(r) an undertaking under oath or affirmation by the EAP in relation to:</p> <ul style="list-style-type: none"> (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and 	YES	Section 10
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	YES	Section 9
(t) any specific information that may be required by the competent authority; and	YES	Appendix I
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	NO	Not applicable



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Glossary of Terms

Term/abbreviation	Description
Aquaculture	the cultivation of aquatic animals and plants, especially fish, shellfish, and seaweed, in natural or controlled marine or freshwater environments
Aquaponics	A combination of aquaculture and hydroponics, i.e. an aquaculture system in which the waste produced by farmed fish (or other aquatic creatures) supplies the nutrients for plants grown hydroponically, which in turn purify the water
ASPT	Average Score per Taxon
BA	Basic Assessment
BAR	Basic Assessment Report



Term/abbreviation	Description
BID	Background Information Document
BPEO	Best Practicable Environment Option
CA	Competent Authority
CAPEX	Capital expenditure
CBA	Critical Biodiversity Areas
CR	Critical
CV	Curriculum Vitae
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DO	Dissolved Oxygen
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EIS	Ecological Important Service
EMF	Environmental Management Framework
EMPR	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Areas
GNR	Government Notice
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
I&AP	Interested and affected parties
IDP	Integrated Development Plan
IDS	Information Decision Systems
IHIA	Intermediate Habitat Integrity Assessment
LED	Local Economic Development
LT	Least Threatened
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act
OPEX	Operating Expenditure
PACA	Protected and Conservation Areas
PES	Present Ecological State
pH	is a measure of how acidic/basic water is
RAS	Recirculating Aquaculture System
SACAD	South African Protected Areas Database
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SDF	Spatial Development Framework
SG	Surveyor General
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TDS	Total Dissolved Solids
Tilapia	Tilapia is the common name for nearly a hundred species of cichlid fish from the tilapiine cichlid tribe. Tilapia are mainly freshwater fish inhabiting shallow streams, ponds, rivers and lakes and less commonly found living in brackish water. Tilapia can feed on algae or any plant-based food, which reduces the cost of tilapia farming.
VU	Vulnerable



1 INTRODUCTION

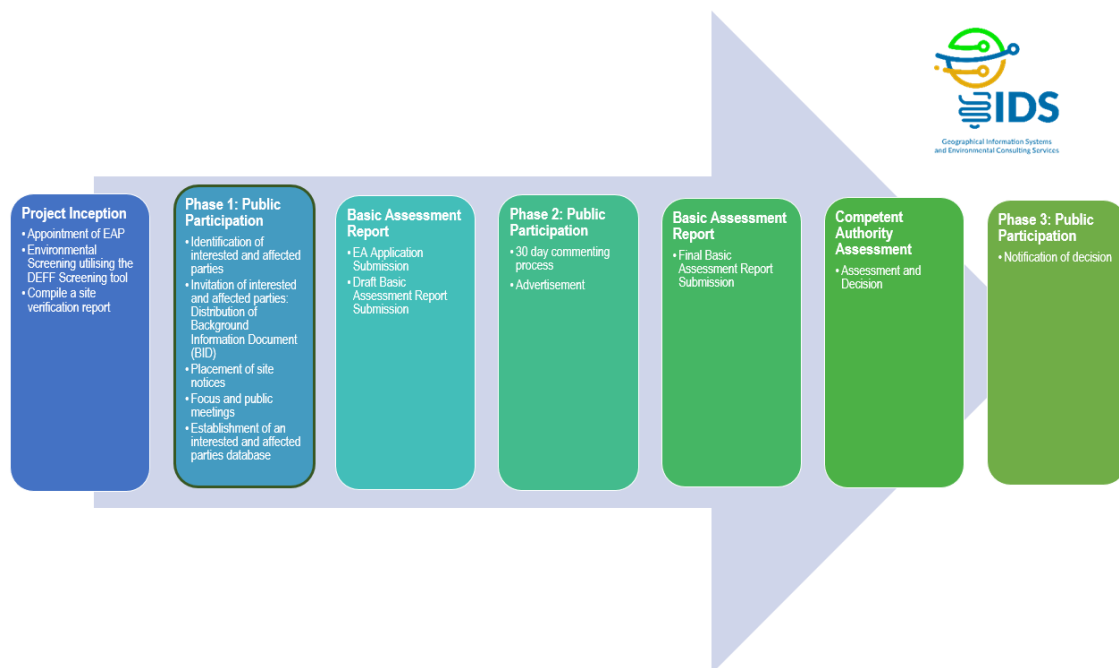
Greenies Farm aims to establish an agri-business through the development of aquaponics (a combination of aquaculture and hydroponics). Production will be based on Recirculating Aquaculture System (RAS).

Information Decision Systems has been appointed by the National Department of Forestry, Fisheries and the Environment (DFFE), runs the Special Needs and Skills Development Programme which is aimed at providing Environmental Services, pro-bono, to small-scale businesses. The programme offers the undertaking of a Basic Assessment for projects that require this assistance in applying for Environmental Authorisation.

Therefore, IDS is currently undertaking a Basic Assessment Process for Greenies Farm (Pty) Ltd for the proposed establishment of an agri-business through the development of aquaponics i.e. a combination of aquaculture and hydroponics within the Jericho agricultural Area, under the jurisdiction of Bojanala District Municipality, North West Province.

The proposed development triggers listed activities in terms of the Environmental Impact Assessment (EIA) Regulations, Government Regulations (GNR) 324 and 327 of April 2017 promulgated under the National Environmental Management Act (NEMA) (Act no 107 of 1998). In terms of these Regulations, a Basic Assessment (BA) should be undertaken for the proposed project. The EAP will be managing the BA process on behalf of the project applicant.

2 METHODOLOGY: BASIC ASSESSMENT PROCESS



This section of the report describes the approach undertaken for the Basic Assessment process inclusive of the competent authority process that has been undertaken as well the details of the applicant and the independent Environmental Assessment Practitioner.

2.1 Pre-application phase

No pre-application meeting has been conducted for this application.

2.2 Application for Environmental Authorisation

The Environmental Authorisation Application has been lodged simultaneously with the Draft Basic Assessment report to the North West Department of Economic Development, Environment, Conversation and Tourism.

2.3 Basic Assessment Study

A Basic Assessment (BA) is the level of environmental assessment applicable to activities listed in Listing Notices 1 and 3 of the Environmental Impact Assessment (EIA) Regulations 2014 as amended in April 2017. A BA is applied to activities that are considered less likely to have significant environmental impacts and, therefore, unlikely to require a detailed Environmental Impact Assessment (EIA).

The BA aims to achieve the following:

- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed project;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Undertake an impact and risk assessment process inclusive of reasonably foreseeable cumulative impacts (where applicable). The focus being; determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the project and the risk of impact of the proposed activity on these aspects to determine the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and the degree to which these impacts:
 - can be reversed;
 - may cause irreplaceable loss of resources; and
 - can be avoided, managed or mitigated.

This draft Basic Assessment Report (DBAR) has been compiled in accordance with the stipulated requirements in GNR 326, Appendix 1 of the EIA Regulations, 2014 (as amended in 2017), which outlines the legislative BA process and requirements for assessment of outcomes, impacts and residual risks of the proposed development. The DBAR further incorporates the findings and recommendations of the specialist studies conducted for the project.

An Environmental Management Programme (EMPr) has been compiled according to Appendix 4 of GNR 326 of the EIA Regulations, 2014 (as amended in 2017) for the construction and rehabilitation phases of the project and attached as **Appendix H**. The EMPr provides the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/ or eliminate any anticipated negative environmental impacts and to enhance positive impacts. The EMPr provides strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

2.4 Specialist Assessments undertaken

To ensure a comprehensive meticulous scientific approach to the BA study, IDS has appointed a number of specialist studies in order to comprehensively identify both potentially positive and negative environmental impacts (social and biophysical), associated with the proposed project, and where possible to provide mitigation measures to reduce the potentially negative impacts and enhance the positive impacts (**Table 1**). The specialist studies are attached as **Appendix G**.

Table 1: Specialist assessments conducted in support of the Basic Assessment process for the proposed development

Specialist Assessment	Organisation	Date	Appendix on the BA Report
Phase 1 Heritage Impact Assessment	Tsimba Archaeological Footprints (Pty) Ltd	June 2021	Appendix G1
Freshwater Impact Assessment	Information Decision Systems (Pty) Ltd	July 2021	Appendix G2
Terrestrial Biodiversity Impact Assessment	Information Decision Systems (Pty) Ltd	July 2021	Appendix G3
Specialist Reviewer	The Biodiversity Company	July 2021	

2.5 Details of the Applicant

Greenies Farms is the project applicant for the proposed development and the details are provided in **Table 2** below;




Table 2: Project applicant details

Company Name	Greenies Farms (Pty) Ltd	
Contact Person	Mr O.R Kwape	
Contact Details	072 6055 304	
Email	greeniesfarms@gmail.com	

2.6 Details of the Environmental Assessment Practitioner

Information Decision Systems (Pty) Ltd is the appointed independent Environmental Assessment Practitioner (EAP) for the proposed development of the Greenies Farms as per **Table 3** below. The CV of the EAP has been attached as **Appendix I**.

Table 3: EAP details

Company Name	Information Decision Systems (Pty) Ltd	
Contact Person	Ms Vanessa Nkosi	
Email	vanessa@ids-cc.co.za	
Tel	087 353 2576	
Fax	086 685 7767	



3 PROJECT DESCRIPTION

3.1 Locality

The Greenies Farms is located in Jericho, a village within the Bojanala Platinum District in the North West province. The village is under the administration of the *Bakwena ba Mogopa* tribal authority. Jericho is approximately 32km north east of Brits. The geographic coordinates of the study area have been described in **Table 4** below.

Table 4: Geographical coordinates of study area

Site name	Latitude (S)	Longitude (E)
Greenies Farm	25°18'30.48"S	27°48'9.90"E

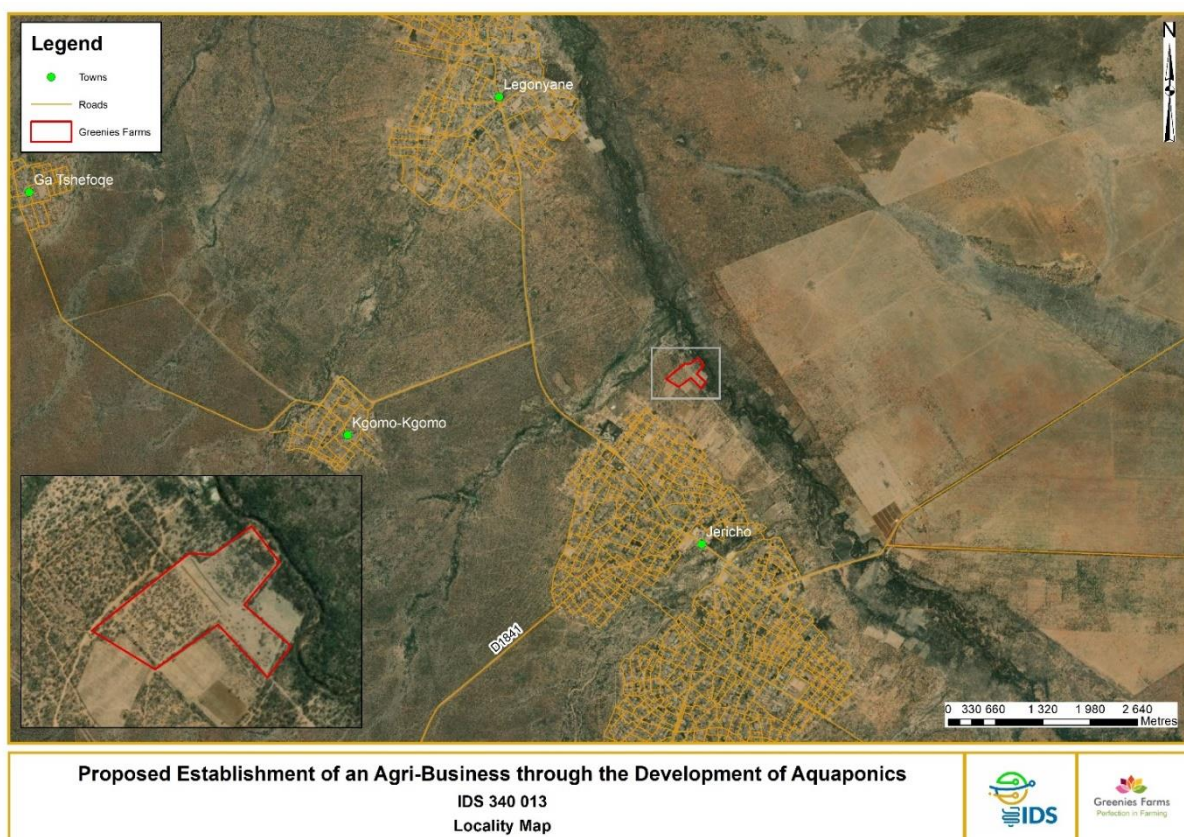


Figure 1: Site Locality

3.2 Property Description

The Greenies Farm is located within Farm 227 Portion 0 and 1 under the ownership of the *Bakwena ba Mogopa* tribal authority (**Figure 2**). The applicant has been issued with a permit to occupy and utilise less than 20 ha of land by the tribal authority.

The table below describes the Surveyor General 21-digit code of the affected property.

Table 5: SG 21-digit code of the study area

Farm name	SG Code
Farm 227 Portion 0	B0JQ0000000022700000
Farm 227 Portion 1	B0JQ0000000022700001



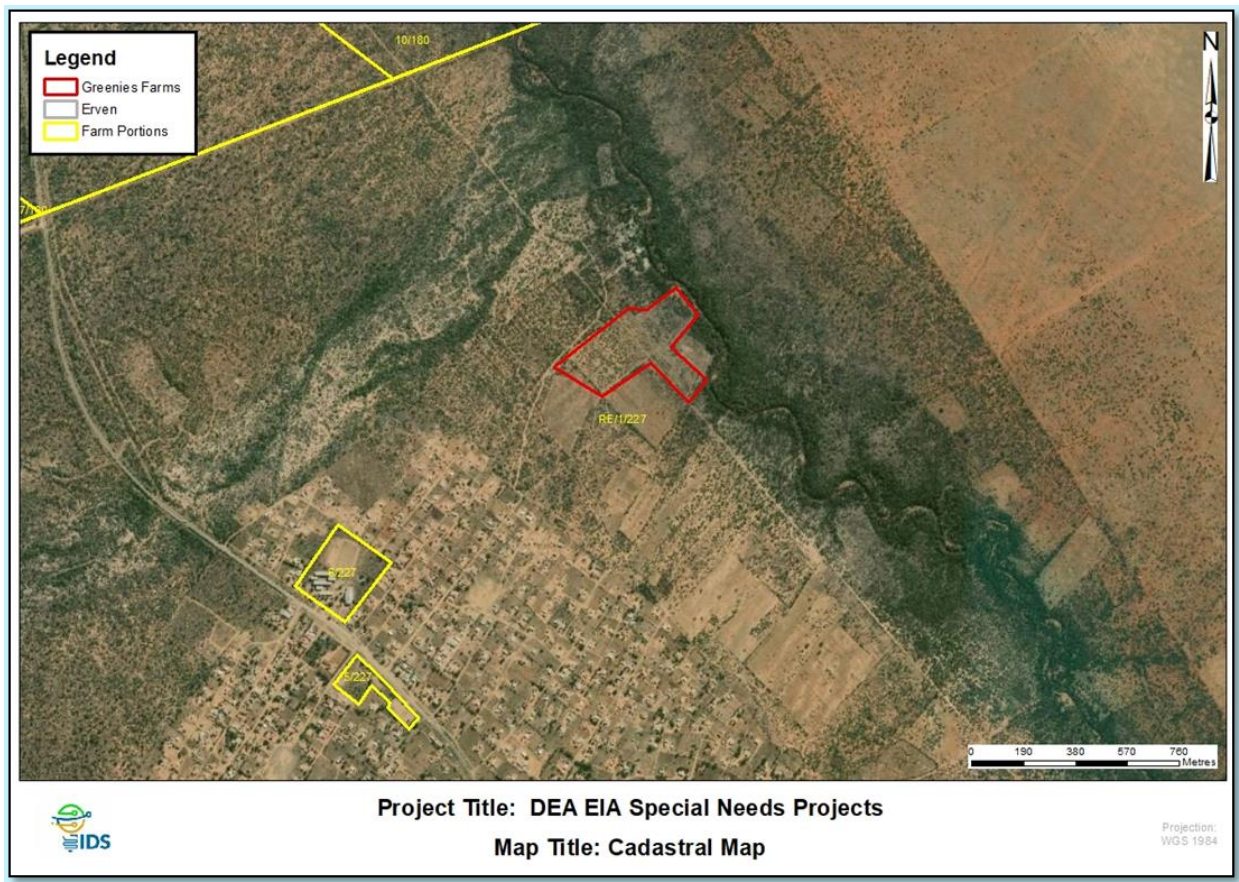


Figure 2 : Cadastral map of the study area

3.3 Scope of Works

Phase 1: Fish Production

Greenies Farm aims to establish an agri-business through the development of aquaponics (a combination of aquaculture and hydroponics). Production will be based on Recirculating Aquaculture System (RAS) (Figure 5). Water flows between aquaculture fish tanks and plant growing beds in a reticulated and closed system. The fish waste in the water is a key ingredient in the supplying of nutrients to the plant, enabling an unnecessary need for fertilisers, advancing organic fresh produce. The symbiotic relationship is such that fish waste provides nutrients, while the plants clean the water to remove all the harmful ammonia produced by the fish. Further supplements will be done such as aeration to ensure oxygen levels in the water. The facility will grow 100tons of Nile Tilapia and estimated 600tons of vegetables (Figure 3).

3.3.1 Nile Tilapia

The Nile tilapia (*Oreochromis niloticus*) is a benthopelagic fish (i.e. living and feeding near the bottom as well as in midwaters or near the surface) adapted to fresh water and low salinity brackish water conditions. The Nile tilapia can be distinguished from other *Oreochromis* species of Tilapia through the colour patterns on its body and fins. Nile tilapia is the most widely farmed Tilapia species in the world, representing approximately 83% of total Tilapia production. This is because of its rapid growth, late age of sexual maturity and planktivorous feeding habits. The characteristic rapid growth to market size of Nile tilapia has made it a well-accepted fish with Tilapia farmers.

Nile tilapia generally have several attributes which make them attractive as a culture species. These include:

- High tolerance of poor water quality and crowding,
- Good performance on formulated feeds with lower protein levels,
- Acceptance of feed with a higher percentage of plant proteins,



- A relatively high degree of disease resistance,
- Widespread consumer appeal, being a mild flavoured white flesh,
- Hardiness and adaptability to a wide range of culture systems, and
- It is considered as the only economically viable Tilapia species globally

Nile tilapia exhibits a broad invasive potential over most of southern Africa that overlaps with the natural distribution range of the indigenous species such as Mozambique tilapia (*Oreochromis Mozambique*). Hence, the introduction of the invasive Nile tilapia into the South African river systems that are still free of Nile tilapia, is a cause of concern. It is evident that Nile tilapia has established itself and naturalised in many tropical and sub-tropical environments in eastern and southern Africa.



Figure 3: Image of a Nile Tilapia

3.3.1.1 Biological characteristics of the Nile Tilapia

Nile tilapia can be produced in different aquaculture systems, ranging from open ponds fertilized with manure, to closed recirculating aquaculture systems (RAS). Production, varying from subsistence culture to high-tech aquaponics occurs in freshwater and in brackish water, at optimal temperatures between 28°C and 36°C.

Under good growth conditions, the Nile tilapia will reach sexual maturity in farm ponds at an average of three (3) to five (5) months and reach a weight of 150 to 200 grams. As the fish become sexually mature (at a small size), they begin to reproduce instead of growing, leading to overcrowding and stunted growth.

Overcrowding also leads to having mixed-sized fish with very little market value. It may be necessary to separate the tilapia by sex before they are old enough to reproduce, or feed male hormones to hatchlings for 21 days, to produce predominantly male fish, as a sex reversal rate of 90% can be achieved.

Figure 4 below describes the production cycle of Nile tilapia.



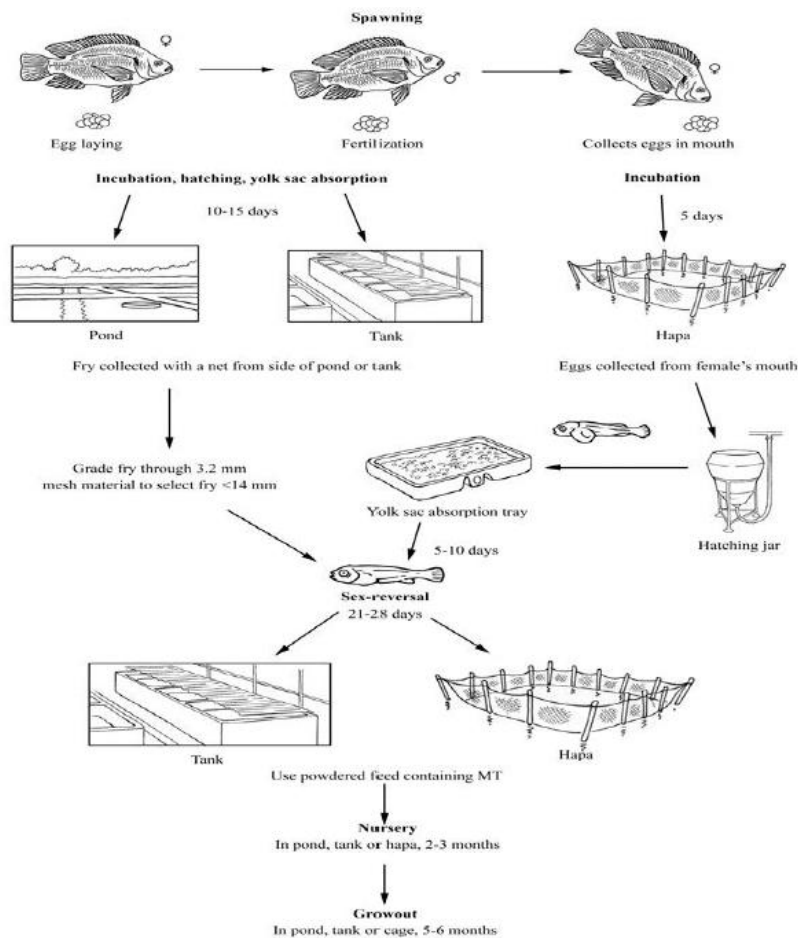


Figure 4: Production cycle of Nile tilapia

Like other *Oreochromis* species of tilapia, the breeding process in the Nile tilapia starts when the male establishes a territory, excavates a crater-like spawning nest and guards his territory. The male mates with the females in the spawning nest. After a short mating ritual, the female spawns in the nest, and soon after fertilization by the male, collects the eggs into her mouth (buccal cavity) and moves off.

The female incubates the eggs in her mouth and broods the fry after hatching, until the yolk sac is absorbed. The incubating and brooding phase is accomplished in one (1) to two (2) weeks, depending on temperature. After the fry have been released and begin to feed, they may swim back into the mouth of the female, if danger threatens. Also, being a maternal mouth brooder, the number of eggs per spawn in Nile tilapia is small in comparison with most other pond fishes. Egg number is proportional to the body weight of the female. For example, a 100-gram female will produce about 100 eggs per spawn, while a female weighing between 600-1000 grams can produce between 1000-1500 eggs. The male remains in his territory, guarding the nest, and can fertilise eggs from a succession of females.

3.3.1.2 Physical requirements of Nile Tilapia

The table below describes the physical requirements of farming Nile Tilapia.

Table 6: Description of the physical requirements of Nile Tilapia

Item	Description
Feeding	Nile tilapia are often considered as filter feeders because they can efficiently harvest plankton from the water. However, they do not physically filter the water through gill rakers as efficiently as true filter feeders such as the gizzard shad (<i>Dorosoma cepedianum</i>) and silver carp (<i>Hypophthalmichthys molitrix</i>).

Item	Description
	Protein is required for optimal growth and quality of tilapia and has been reported to be as high as 50% in the diet for small fingerlings.
Salinity	All tilapia are tolerant to brackish (slightly salty) water. The Nile tilapia is the least saline tolerant of the commercially important species but grows well at salinities up to 15 ppt. The Nile tilapia reproduces at salinity levels of 10 to 15 ppt but perform better at salinities below 5 ppt. Fry numbers decline substantially at 10 ppt salinity.
Water temperature	Generally, a tilapia stops feeding when water temperature falls below 17°C. The intolerance of tilapia to low temperatures is a serious constraint for commercial culture in temperate regions. The lower and upper lethal temperatures (i.e. the survival limit) for Nile tilapia are 11-12 °C and 42 °C, respectively, while the preferred temperature ranges from 28°C to 36 °C. Growth at this optimal temperature is typically three times greater than when the temperature is lower. Reproduction is best at water temperatures higher than 27°C and does not occur below 20°C. In subtropical regions with a cool season, the number of fry produced will decrease when daily water temperature averages is less than 24°C.
Oxygen Requirement	Tilapia generally survive routine dawn dissolved oxygen (DO) concentrations of less than 0.3 mg/L, considerably below the tolerance limits for most other cultured fish. Studies show that Nile tilapia grow better when aerators are used to prevent morning DO concentrations from falling below 0.7 to 0.8 mg/L (compared with unaerated control ponds). Although tilapia can survive acute low DO concentrations for several hours, tilapia culture systems should be managed to maintain DO concentrations above 1 mg/L. Metabolism, growth and, possibly, disease resistance are depressed when DO falls below this level for prolonged periods.
pH Requirement	Tilapia can survive in pH of water supply ranging from 5 to 10 but perform optimally in a pH range of 6 to 9. Acidic water (below pH 5) will require the use of a reservoir where water acidity is neutralizing using lime before use. The pH level of supply water can be measured with a pH test kit or pH meter.
Water Requirement	A typical pond culture grow-out for tilapia, that discharges all effluent, will require approximately 3 250 to 3 750 m ³ of water per hectare per month. Recirculating pond systems (zero discharge) may use as little as 300 m ³ of water per hectare per month and water supply will be required to top up the water levels based on the evaporation rates experienced at the tilapia farm, however, this is very area or climatic region specific.
Ammonia Requirement	Ammonia is very toxic to tilapia, and they are not able to survive in water with unionised ammonia concentration of less than 2mg/L. When Tilapia are transferred into water that do not meet the above stated ammonia requirement, massive mortality usually occurs within a few days. However, when gradually adapted to sub-lethal levels, approximately half the fish will survive 3 or 4 days at unionized ammonia concentrations as high as 3 mg/L. The first mortalities from prolonged exposure may begin at concentrations as low as 0.1 mg/L. Unionized ammonia begins to reduce food consumption at concentrations as low as 0.08 mg/L. From the information above, it is recommended that ammonia levels be maintained below 0.1 mg/L.

Established Nile tilapia populations have been recorded in eight (8) eco-regions. Based on the eco-regions identified in the map below, the following provinces are considered to be suitable for Nile tilapia production in South Africa:

- Limpopo
- Northern Kwa-Zulu Natal
- Mpumalanga
- Selected regions of Western Cape
- Selected regions of the Northern Cape
- Select regions of the North West Province

Currently, the majority of registered Tilapia farms are located in the Gauteng, Limpopo, Mpumalanga, and the North West provinces respectively. Most tilapia farmers are small scale farmers and they employ the RAS and pond culture systems. The Limpopo province accounts for the highest share (37%) of South Africa's tilapia production, this is followed by the North West



(26%) and the Gauteng Province (18%), respectively. The Eastern Cape, KwaZulu Natal, Mpumalanga, Northern Cape and Western Cape collectively accounted for 19% of the total tilapia production.

3.3.1.3 Recirculating Aquaculture Systems

Recirculation aquaculture systems (RAS) have been developed, mostly in the temperate regions, to culture tilapia year-round under controlled conditions. RAS makes use of technology that allows for the reuse of water in production, as the system is based on mechanical and biological filters. RAS can be used at different intensities depending on the volume of water that is being recirculated or re-used. By making use of recirculation technology, fish producers can control all the production parameters in the system, thus making skills and expertise in not only aquaculture but RAS essential (Figure 5).



Figure 5: An illustration of the recirculating aquaculture system aquaponics

A recirculating system is not limited to the six aspects mentioned above and can be tailored specifically for tilapia production and site conditions of the aquaculture operation.

The facility will have brick and mortar hatchery and nursery, grow-out greenhouse (2100 m²), brick and mortar processing unit, office, ablution facilities, as well as duckweed and black soldier fly greenhouse which is feed.

Phase 2: Poultry and piggery

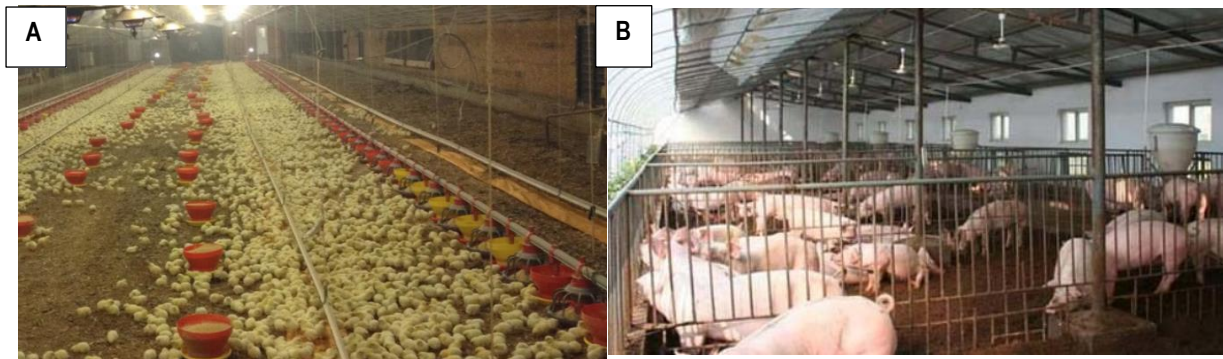
The second phase of the project will consist of 4 broiler houses (each house to hold 50100 chickens) and 1 layer broiler (80 000 layer chickens). Piggery operation to hold 800 pigs. A snail greenhouse which will feed on green leafy offcuts from the vegetables grow-out. Heating will be initially from electricity and coal, with a standby diesel generator as backup. The plan is to later use methane from biodigester.

Organic waste will be used in the following manner:

- fish guts fed to Black Soldier Fly larvae that will feed on guts, and dried to be fed to fish, chicken and pigs;
- vegetable leaves to be fed to snails, chicken, pigs and some as manure.
- fish, chicken and pig poop to be used for biodigester as well as Black Soldier Fly larvae.



Table 7: Images of the poultry farming proposed, A: broiler houses and B: Piggery operation



3.4 Physical size of activity

The total footprint of the site is **approximately 4 ha** and has been broken down into the following dimensions as per table below.

Table 8: Facilities dimensions

Facility name	Dimension	Geographic coordinates
Tilapia System	150x15m	25°18'34.15"S 27°48'4.82"E
Piggery	90x15m	25°18'29.53"S 27°48'6.17"E
Poultry	Four (4) Broilers 150x15m	Broiler House 1 25°18'32.62"S 27°48'5.78"E
		Broiler House 2 25°18'32.77"S 27°48'7.04"E
		Broiler House 3 25°18'32.13"S 27°48'8.23"E
		Broiler House 4 25°18'32.30"S 27°48'9.52"E
Nursery	400m ²	25°18'35.02"S 27°48'6.69"E
Snail Greenhouse	15x10m	25°18'33.97"S



Facility name	Dimension	Geographic coordinates
		27°48'3.41"E
BSF Greenhouse	15x10m	25°18'34.42"S 27°48'3.90"E
Duckweed Greenhouse	15x10m	25°18'35.08"S 27°48'4.38"E
Brick and mortar house	20x30m	25°18'32.57"S 27°48'4.44"E
Biodigester	Not applicable	25°18'33.40"S 27°48'3.83"E
Oxygen plant	630m ²	25°18'35.60"S 27°48'5.13"E
Generators		Generator 1
		25°18'33.69"S 27°48'2.92"E
		Generator 2
		25°18'33.43"S 27°48'2.58"E
Concrete compost area	20x30m	25°18'30.87"S 27°48'4.05"E
Staff Toilets	15x10m	25°18'31.45"S 27°48'2.89"E
Office	20x30m	25°18'33.40"S 27°48'1.51"E
Entrance 1	Not Applicable	25°18'33.61"S 27°47'59.77"E
Entrance 2	Not Applicable	25°18'32.62"S 27°48'1.69"E
Access Road 1	265m	Start Point
		25°18'33.60"S 27°47'59.79"E
		End Point
		25°18'29.45"S



Facility name	Dimension	Geographic coordinates
		27°48'8.12"E
Access Road 2	293m	Start point
		25°18'33.60"S
		27°47'59.79"E
		End point
		25°18'30.73"S
		27°48'9.10"E
Access Road 3	268m	Start point
		25°18'33.60"S
		27°47'59.79"E
		End point
		25°18'34.81"S
		27°48'6.03"E



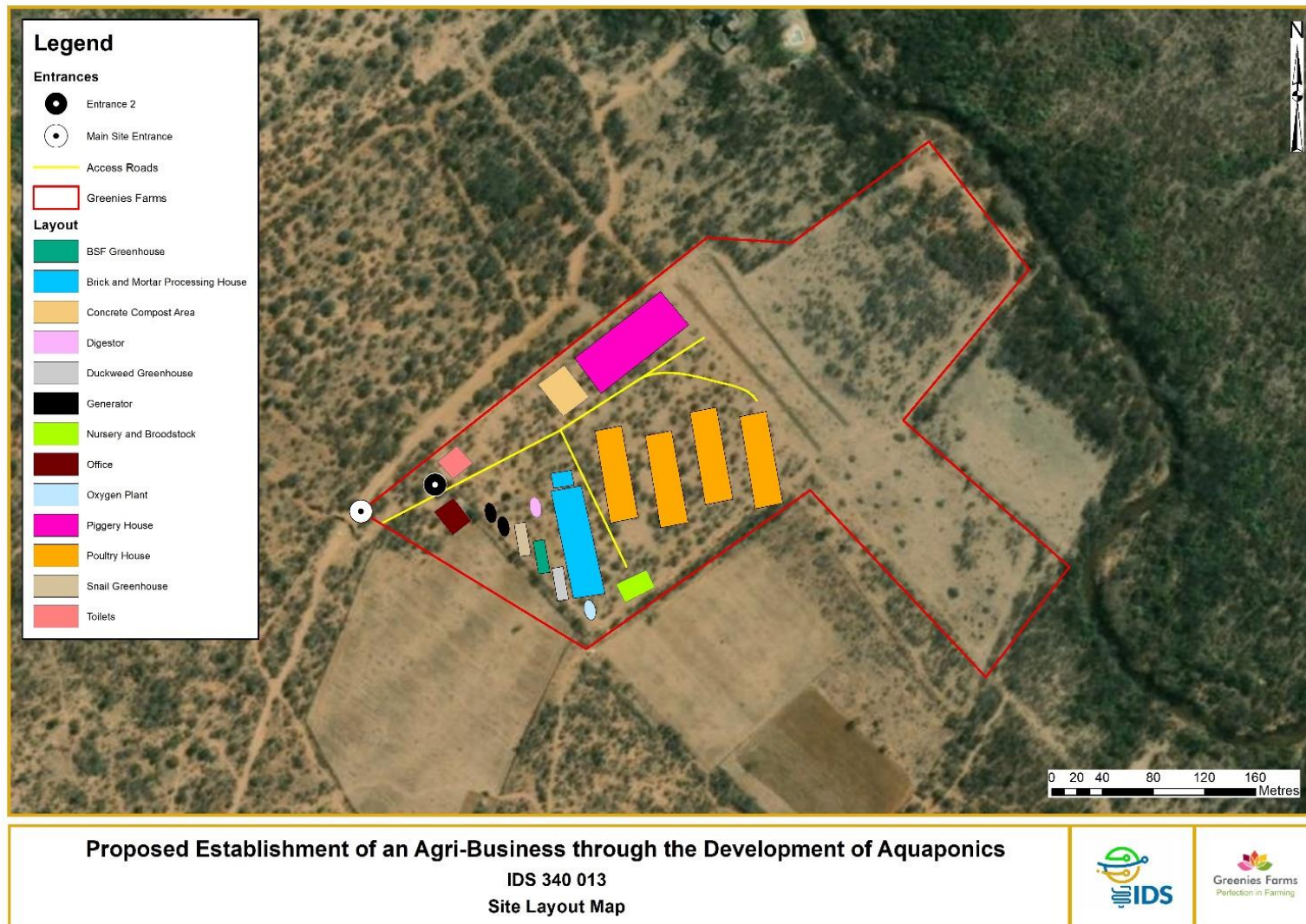


Figure 6: Proposed site layout plan



3.5 Site Access

The nearest local road is located approximately 1.2km away from the site. A dirt road directly leads to the site. The applicant proposes to develop multiple access roads within the site especially to each unit.

The coordinates of the access road have been indicated in **Table 8** above.

The route position information has been attached as **Appendix D**.

3.6 Needs and desirability

The needs and desirability discussed below is as per Notice 891 of 2014, Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations 2010.

3.6.1 Securing Ecological Sustainable Development and use of natural Resources

How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

Ecosystem Threat Status

According to the National Environmental Management: Biodiversity Act, the entire extent of the project area is within a vulnerable ecosystem, which is an ecosystem which has a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.

Critical Biodiversity Areas

According to the DEA Screening Tool, an aquatic CBA and ESA is noted within the site, resulting in a very high sensitivity towards aquatic biodiversity. In addition, according to the North West Conservation plan, the proposed study area falls within an Ecological Support Area (ESA). The study area is dominated by an ESA 2, while the north-eastern and western portions of the site is within an ESA 1. The table below depicts the percentage cover the Ecological Support Areas (ESA's) in relation to the farm boundary.

Terrestrial Biodiversity	Hectares (ha)	Percentage Cover
Ecological Support Area 1 (ESA1)	4.42	49.61
Ecological Support Area 1 (ESA1)	4.49	50.39

Environmental Management Framework

According to the Madibeng Environmental Management Framework 2009, harvesting of natural resources in an unsustainable manner, agricultural activities that are poorly governed result in biodiversity loss and loss of wetlands and degradation of freshwater systems are noted as pressures on the environment. The proposed development has been designed strategically to reduce the footprint on the environment with the aim of reducing impacts on the biodiversity and freshwater environment.

Spatial Development Framework

The Madibeng Spatial Development Framework (2015), identified the protection and conservation of natural areas as well as areas with high agricultural potential as a challenge to the municipality. The proposed development is situated within high agricultural potential land. The proposed development holistically is an agricultural activity which is in line with the current zoning of the site.

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?

Based on the terrestrial assessment, no species of conservation concern were noted on site and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.



All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighbouring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

Therefore based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment.

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?

Based on the terrestrial assessment, no species of conservation concern were noted on site and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.

All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighbouring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

Therefore based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment.

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?

Construction Phase

No waste streams are anticipated to be produced from construction activities proposed on site other than domestic and construction waste which will be disposed of to a registered landfill. Consequently, volumes can only be determined at a later stage (development stage of the project).

Operational Phase

Due to the expected activities to be undertaken, the RAS system is a closed system with waste being utilised for the vegetation, biodigester (for heat generation) and black soldier fly. In addition, waste from the piggery will be utilised within the biodigester to generate heat. Waste from poultry will be used for black soldier fly and digester (heat generation). Surplus waste will be utilised as fertilisers.

Decommissioning phase

No waste streams are anticipated to be produced from decommissioning activities proposed on site other than domestic and construction waste which will be disposed of to a registered landfill.

How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? 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?

No disturbance is anticipated on the natural landscape or nation's cultural heritage by the development. A Heritage Impact Assessment was conducted and it was concluded that no heritage resources are located on site.

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?

The proposed development will not impact on any non-renewable natural resources.

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?

The proposed development will not impact on any renewable natural resources.

How will the ecological impacts resulting from this development impact on people's environmental right in terms following;

Construction and Operational Phase

The following impacts have been identified based on the scope of work to be carried out in comparison to the receiving environment:

- Removal of existing vegetation community which includes the loss of an Ecological Support Area (ESA) and a Vulnerable ecosystem;
- Disturbance and mortality of faunal species due to habitat loss;
- Further infestation of alien and invasive plant species;
- Reduction in air quality due to the generation of dust caused by construction activities;
- Sedimentation and erosion due to the clearance of vegetation;
- The loss of floral and faunal species caused by the transmission of disease-causing microbes and bad odours (to be mitigated by digester given that it is closed, as well as black soldier fly to neutralize the odours) due to the mismanagement and storage of animal waste;
- Spread of invasive fish species into the nearby river system and the Limpopo catchment (contained in the closed RAS system);
- The loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system; and
- An increase of pests due to the mismanagement of waste and bad odours.

Decommissioning Phase

The following impacts have been identified based on the scope of work to be carried out in comparison to the receiving environment:

- Infestation of floral alien invasive species, due to the clearing of vegetation and infrastructure;
- Sedimentation and erosion due to the clearance of vegetation and infrastructure;
- Spread of invasive fish species into the nearby river system and the Limpopo catchment;
- The loss of floral and faunal species caused by the transmission of disease-causing microbes; and
- The disturbance of faunal movements, due to construction remnants.

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.)?



Based on the terrestrial assessment, no species of conservation concern were noted on site and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.

All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighbouring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

Therefore based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment.

Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?

Based on the terrestrial assessment, no species of conservation concern were noted on site and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.

All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighbouring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

Therefore based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment.

Considering the need to secure ecological integrity and a healthy biophysical 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 ecological considerations?

No site or design alternatives were noted for this development, the site layout plan was designed in consultation with the independent relevant specialists with the aim of reducing the development footprint.

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?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.



3.6.2 Promoting justifiable economic and social development

What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?

Integrated Development Plan

The Madibeng Local Municipality IDP has identified poor economic climate and outlook as one of the threats to the municipality. However, industrialisation and agriculture has been noted as an opportunity. It is for this reason that the proposed development has been centred towards enriching local economy through industrialisation and agriculture.

In addition, in Ward 2, the IDP has prioritised amongst others, agriculture through Local Economic Development (LED). The LED unit ultimate outcome is increased economic growth, enhanced tourism, capacitated SMMEs and well administered economic activities.

The Bojanala Platinum District Municipality IDP has identified that Agriculture contributes about 2.6% of the total GDP and 19% to formal employment in the district. However, land reform has created uncertainty and discouraged investment within this sector and has resulted in many commercial farms becoming subsistence farms. The mining industry receives priority in terms of land use

Spatial Development Framework

The Madibeng Spatial Development Framework (2015), identified the protection and conservation of natural areas as well as areas with high agricultural potential as a challenge to the municipality. The proposed development is situated within high agricultural potential land. The proposed development holistically is an agricultural activity which is in line with the current zoning of the site.

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?

The Total OPEX (Operating Expense, Operating Expenditure, Revenue Expenditure) and CAPEX (Capital Expenditure, Capital Expense) is R 14 217 824.00, with seasonal job creation during the development phase, for 25 people, and permanent job creation in the operational phase, for 22 people. This will contribute towards decreasing the unemployment rate.

How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

In terms of location, describe how the placement of the proposed development will result in the creation of residential and employment opportunities in close proximity to or integrated with each other, reduce the need for transport of people and goods, and result in access to public transport or enable non-motorised and pedestrian transport?

The proposed project is located in Jericho within the Madibeng Municipality. A residential area is located less than 50m of the site. This residential area has been noted as a direct beneficiary of the project in terms of socio-economic benefits. It is anticipated that the residents of this area will not require public transport to get into the proposed industrial area.



How were a risk-averse and cautious approach applied in terms of socio-economic impacts in terms of limits of current knowledge, level of risk associated with the limits of current knowledge and how and to what extent was a risk-averse and cautious approach applied to the development ?

A SWOT analysis was conducted for the proposed development with the aim of identifying risks associated with the development.

How will the socio-economic impacts resulting from this development impact on people's environmental right in terms of Negative and Positive impacts?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

It is for this reason that no negative impacts are anticipated as far as people's environmental rights are concerned. Negative impacts indicated on the Basic Assessment report have been address with mitigation measures with the aim of ensuring that people's environmental rights are not violated in any manner.

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?

It is for this reason that no negative impacts are anticipated as far as people's environmental rights are concerned. Negative impacts indicated on the Basic Assessment report have been address with mitigation measures with the aim of ensuring that people's environmental rights are not violated in any manner.

Therefore, the identified need by Greenies Farms to establish an aquaponics farms in a rural setting should be regarded as an initiative that will grow the local municipality and its society in general for a long term.

Based on the terrestrial assessment, no species of conservation concern were noted on site and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.

All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighbouring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

As a result, the developments' ecological impacts are noted to be low in comparison to the positive socio-economic impact the development will have on the local area.

What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?

The proposed development has considered the current site in terms of visual and heritage impacts. None of these impacts were deemed high to affect the socio-economic considerations of the site. In addition, the need for employment and local economy induction has been considered strongly.



What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?

It is not anticipated that adverse environmental impacts will be distributed in such a manner as to unfairly discriminate against any person. The local community will benefit from the project, as detailed above. In addition, mitigation measures have been provided to mitigate against negative impacts identified.

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?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

Therefore, the identified need by Greenies Farms to establish an aquaponics farms in a rural setting should be regarded as an initiative that will grow the local municipality and its society in general for a long term.

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?

An EMPr has been drafted for the construction and operational phase of the development, to ensure environmental safety during construction, as well as safety of staff on site. Refer to **Appendix H**.

What measures were taken to ensure the participation of all interested and affected parties, ensure participation by vulnerable and disadvantaged persons, promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means?

The public participation process is outlined in **Section 8** and **Appendix E** of this report and includes the process followed to ensure as many I&APs are reached and provided with an opportunity to comment. All comments received will be considered and responded to in a Comments and Response Report.

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?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

Therefore, the identified need by Greenies Farms to establish an aquaponics farms in a rural setting should be regarded as an initiative that will grow the local municipality and its society in general for a long term.

Describe how the development will impact on job creation in terms of, amongst other aspects including the number of temporary versus permanent jobs that will be created?

Job creation and economic development are essential for the survival of local municipality specifically Madibeng. Therefore, based on the above, the development is noted to improve local economy and job creating without adverse impacts on the environment. The



proposed development will therefore feed into these two essential areas of survival during the construction and operation phases of development. Results from growing local economies and access to job opportunities also mean the socio-economic status of the locals within the municipality will be improved.

Therefore, the identified need by Greenies Farms to establish an aquaponics farms in a rural setting should be regarded as an initiative that will grow the local municipality and its society in general for a long term.

What measures were taken to ensure that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment?

Section 5 of this BAR summarises the legal and policy context applicable to the proposed development.

A list of organs of state that have been notified and provided with an opportunity to comment on the BAR. IDS is not aware of any current conflicts of interest between organs of state that are required to be resolved.

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 environment will be protected as the people's common heritage?

Specialist studies were commissioned to inform the initial site layout of the development. Factors such as the agricultural potential, vegetation condition and presence/ absence of surface water resources were used to inform the preferred site layout, and realistic mitigation measures are proposed to reduce or enhance impacts.

As such the "measures" that will be taken include the consideration of various specialist inputs to ensure that the best practicable environmental option (BPEO) is assessed and submitted to the Department for approval.

Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?

The mitigation measures proposed must be realistic and implementable for the outcome of the impact assessment to be reliable.

It is the opinion of IDS that the recommended mitigation and monitoring measures put forward by specialist practitioners are realistic given the nature and scale of the proposed development.

What measures were taken to ensure that the 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?

Section 28 of NEMA (Duty of Care) holds every person who causes, has caused, or may cause significant pollution and degradation of the environment accountable. As such, the mechanisms provided for in the NEMA could be used by any person or the responsible authority (ies) to hold those responsible for pollution and degradation of the environment accountable.

The necessary rehabilitation measures are incorporated into the EMPr, which will require that the applicant be responsible for the costs of remedying environmental degradation (e.g. erosion of topsoil or pollution of groundwater) that may occur during the construction phase.

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?

Section 28 of NEMA (Duty of Care) holds every person who causes, has caused, or may cause significant pollution and degradation of the environment accountable. As such, the mechanisms provided for in the NEMA could be used by any person or the responsible authority (ies) to hold those responsible for pollution and degradation of the environment accountable.



The necessary rehabilitation measures are incorporated into the EMPr, which will require that the applicant be responsible for the costs of remedying environmental degradation (e.g. erosion of topsoil or pollution of groundwater) that may occur during the construction phase.

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?

With any development there is the possibility of an influx of people into the area. Such an impact is often related to the development of industrial areas, as projects like these tend to provide employment opportunities for several years.

Employment should be prioritised for the local, youthful population. Labour accommodation will also not be provided, which means that people should be less inclined to move to the area in search of jobs.

The potential concerns with an influx of job-seekers would related competition over job opportunities in the area, as work is already very limited. More importantly, it is important to note that an influx of job-seekers (such as contractors) are often associated with an increase in risky sexual behaviours or even sex work. This could cause a spike in sexually transmitted diseases, such as HIV/Aids.

Specialist workers attracted to the area during the construction phase might encourage practices such as prostitution, which are often fuelled by promiscuous sexual relationships, usually driven by financial incentives.

Conflicts can be stirred as a result of many other factors. Some of these include conflict (but are not limited to):

- An increase in economic disparities between those with jobs and those without;
- Changes in values and changes in 'way of life' of those with jobs;
- Changes in power relations between employed youth and elders;
- Perceived unfair recruitment strategies; and/or
- Perceived preferential procurement strategies.

It should be noted that, as with most social impacts, in-migration may also have a positive impact in terms of providing locals with small business opportunities due to an increased demand for local produce and other goods, as well as opportunities for cultural exchange.

It is the EAPs' opinion that it is highly unlikely for these concerns to be realised, however, as the project will not provide labour accommodation and as labour will be sourced through the LMs.

Employing Local Labour

The amount of jobs to be created has been indicated in **Section 3.7**, it is anticipated that most of these jobs would be available during the construction and operational period of the development. The importance of employing local residents cannot be overstated. Not only does employment afford an income to households that are highly deprived thereof, additional benefits to may include:

- Reducing crime rates;
- Reducing alcohol and drug-abuse rates; and
- Reducing intra-household violence.

Skills Training and Further Training Opportunities

There is a strong possibility that the local residents might not have the skills required to perform the work needed. It is therefore advised that the proponent initiates programmes aimed at ensuring that a number of local residents are provided with appropriate education and skills training to allow them to perform the work needed, or through a community trust mechanism, is afforded the opportunities and access to further education.

3.7 Socio-economic value

What is the expected capital value to be contributed for North West Province Growth Domestic Product?

Total OPEX (Operating Expense, Operating Expenditure, Revenue Expenditure) and CAPEX (Capital Expenditure, Capital Expense) is R 14 217 824.00, with seasonal job creation during the development phase, for 25 people, and permanent job creation in the operational phase, for 22 people. This will contribute towards decreasing the unemployment rate

How many new employment opportunities will be created in the development phase?



Seasonal workers of 25 people

How many permanent employment opportunities will be created during operational phase?

Expected fulltime employment of 22 people

What is the estimated conclusion date of the activity or activities applied for (excluding activities that have operational phase)?

N/A



4 DESIGN AND SITE ALTERNATIVES

In terms of the EIA Regulations 2014 (as amended in 2017) feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the NEMA (Act No. 107 of 1998) (as amended).

As such, an alternative is defined as different means of meeting the general purpose and requirements of the activity which may include alternatives to:

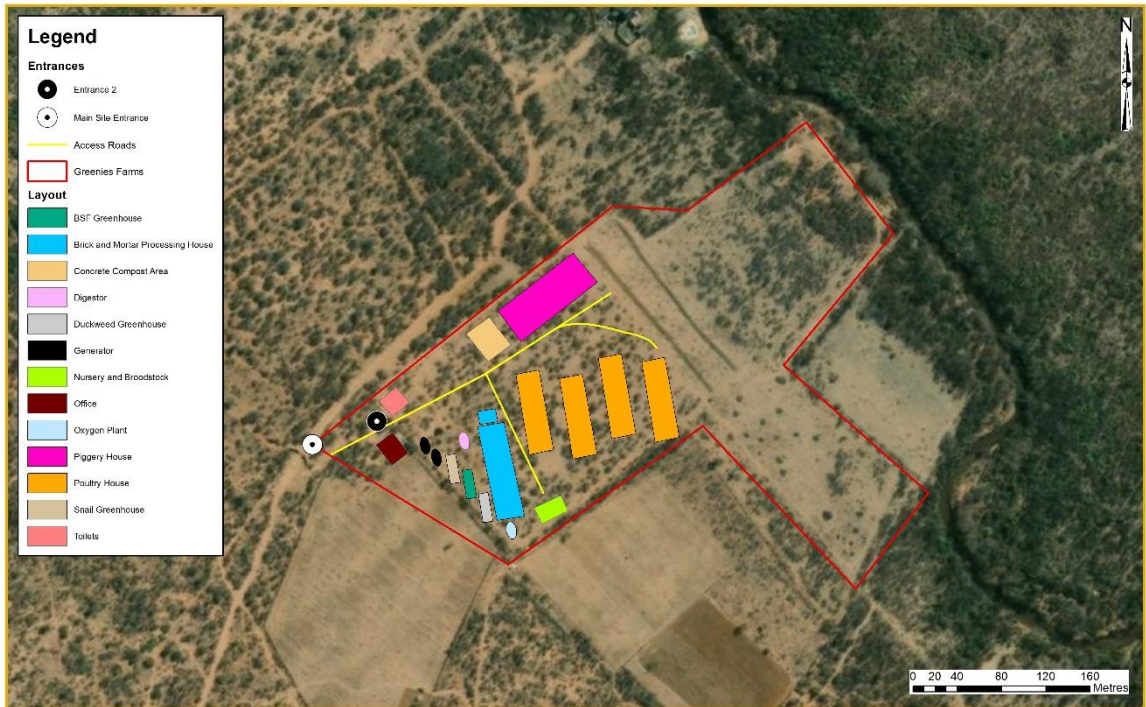


- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;
- the operational aspects of the activity; and
- the option of not implementing the activity.

4.1 Design and Layout alternatives

4.1.1 Site Layout

The applicant has indicated one design option with reference to the biophysical environment on site as detailed by **Table 9** below.

Table 9: Site Layout design alternatives

Site Layout	Description
Layout 1	<p>The most preferred layout is depicted below with a reduced development footprint.</p>  <p style="text-align: center;">Proposed Establishment of an Agri-Business through the Development of Aquaponics IDS 340 013 Site Layout Map</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>



4.2 Site alternatives

No site alternatives have been considered for the proposed development as this is the only available land parcel that the applicant has in possession.

4.3 No-go alternative

The No-Go alternative involves not developing the proposed aquaculture farm with the aim of uplifting local economy.



5 ENVIRONMENTAL LEGISLATION

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant environmental legislation that need to be considered during this study.

This section outlines the legislation that is applicable to the proposed project and has been considered in the preparation of this report.

5.1 Environmental Impact Assessment Regulations

The purpose of these EIA Regulations 2014 as amended in 2017 is to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of and decision, on applications for environmental authorisations for the commencement of activities subjected to environmental impact assessment in order to avoid or mitigate detrimental impacts on the environment and to optimise positive environmental impacts.

Three (3) Listing Notices are identified within the EIA Regulations 2014 as amended in 2017 i.e. R327, R325 and R324.

The table below (**Table 10**) aims to provide the listed activities applicable to the proposed development. All activities listed under R327 and R324 must be investigated and communicated as per procedure prescribed in regulations 19 and 20 of the EIA Regulations 2014 as amended in 2017.

Table 10: Table of applicable listed activities as per EIA Regulations 2014 as amended

Relevant Government Notice	Activity No (s) (relevant notice): e.g., Listing notices 1, 2 or 3	Description of listed activity as per the wording in the listing notice	Applicability
R327	Listing Notice 1: Activity 3 (iii)	The development and related operation of facilities or infrastructure for the slaughter of animals with a — (i) product throughput of poultry exceeding 50 poultry per day (iii) wet weight product throughput of fish, crustaceans or amphibians exceeding 20 000 kg per annum.	The following production is proposed; <ul style="list-style-type: none"> Produce 100ton of Nile Tilapia Fish (<i>Oreochromis niloticus</i>), with estimated 600tons of green leafy vegetables using a RAS system
R327	Listing Notice 1: Activity 5 (iii)	The development and related operation of facilities or infrastructure for the concentration of— more than 25 000 chicks younger than 20 days per facility situated outside an urban area	The second phase of the project will consist of 4 broiler houses (each house to hold 50100 chickens) and 1 layer broiler (80 000 layer chickens).

Relevant Government Notice	Activity No (s) (relevant notice): e.g., Listing notices 1, 2 or 3	Description of listed activity as per the wording in the listing notice	Applicability
R327	Listing Notice 1: Activity 6 (i)	The development and related operation of facilities, infrastructure or structures for aquaculture of: (i) finfish, crustaceans, reptiles or amphibians, where such facility, infrastructure or structures will have a production output exceeding 20 000 kg per annum (wet weight);	The following production is proposed; <ul style="list-style-type: none"> Produce 100ton of Tilapia Fish (<i>Oreochromis niloticus</i>), with estimated 600tons of green leafy vegetables using a RAS system
R327	Listing Notice 1: Activity 8	The development and related operation of hatcheries or agriindustrial facilities outside industrial complexes where the development footprint covers an area of 2 000 square metres or more.	The proposed development will be undertaken on a 19 ha of land.
R327	Listing Notice 1: Activity 12 (xii) (c)	Infrastructure or structures with a physical footprint of 100 square metres or more; if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse	The development is within 32 metres of a watercourse.
R327	Listing Notice 1: Activity 19 (i)	The infilling or depositing of any material of more than [5] 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than [5] 10 cubic metres from [—(i)] a watercourse	The development is within 32 metres of a watercourse.
R327	Listing Notice 1: Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity; or (ii) Maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed development will entail the removal of less than 20 ha of indigenous vegetation within 100m of a watercourse.
Listing Notice 3			



Relevant Government Notice	Activity No (s) (relevant notice): e.g., Listing notices 1, 2 or 3	Description of listed activity as per the wording in the listing notice	Applicability
R324	Listing Notice 3: Activity 13 (h)(vi)	The development and related operation of facilities of any size for any form of aquaculture. In North West (iv) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	The proposed development is located within 100m of the watercourse.
R324	Listing Notice 3: Activity 12 (e) (ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. In North West (ii) Within critical biodiversity areas identified in bioregional plans	Construction of piggery infrastructure on 5 hectares of land. The site is within CBA 1, CBA 2 and ESA areas of the North west conservation plan. An aquatic CBA is also noted.
R324	Listing Notice 3: Activity 14 (xii) (ff)	The development of infrastructure or structures with a physical footprint of 10 square metres or more. In North West (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Construction of piggery infrastructure on 5 hectares of land. The site is within CBA 1, CBA 2 and ESA areas of the North west conservation plan. An aquatic CBA is also noted.



5.2 Other applicable environmental legislation

Table 11: Applicable environmental legislation for the proposed development

Legislation, policy and guideline	Year	Applicability to the proposed development
National Environmental Management Act, 1998 (Act No.107 of 1998 as amended).	1998	The National Environmental Management Act (Act No. 107 of 1998) aims at providing for co-operative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.
National Water Act, 1998 (Act No. 36 of 1998) as amended	1998	The National Water Act (Act No. 36 of 1998) (NWA, 1998) was drafted in order to ensure the protection and sustainable use of water resources (including wetlands) in South Africa. According to Section 21 of the NWA, the proposed development triggers Section 21 (c) and (i).
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	1999	The National Heritage Resources Act 25 of 1999 intends 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; to lay down general principles for governing heritage resources management throughout the Republic; to introduce an integrated system for the identification, assessment and management of the heritage resources of South Africa; to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources at national level; to set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance; to control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries; to enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; to provide for the protection and management of conservation-worthy places and areas by local authorities; and to provide for matters connected therewith. According to Section 38 of the National Heritage Resources Act (Act No. 25 of 1999), at the earliest stages of any development project, the agency must be informed. In response, the agency must determine whether or not heritage resources are likely to be impacted by the proposed development.
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	2004	The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for the listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction by preserving sites of exceptionally high conservation value. Listed ecosystems were defined at the local rather than a regional scale and were delineated based on one of the following: The South African Vegetation Map, priority areas identified in provincial conservation plans, national forest types recognised by the Department of



Legislation, policy and guideline	Year	Applicability to the proposed development
		<p>Water Affairs and Forestry (DWAF), as well as highly irreplaceable forests patches or forest clusters systematically identified by DWAF.</p> <p>The study area is located within a vulnerable ecosystem.</p>
National Environmental Management Waste Act, 2009 (Act No. 59 of 2008)	2008	The National Environmental Management: Waste Act (Act 59 of 2008) (as amended) details the protection of the surrounding environment through efficient waste management by the appointed Contractor.
National Development Plan: A Vision for 2030	2030	<p>The South African Government through the Presidency has published a National Development Plan. The Plan Aims to eliminate poverty and reduce inequality by 2030.</p> <p>The Plan has the target of developing people's capabilities to be to improve their lives through education and skills development, health care, better access to public transport, jobs, social protection, rising income, housing and basic services, and safety. It proposes the following strategies to address the above goals:</p> <ol style="list-style-type: none"> 1. Creating jobs and improving livelihoods; 2. Expanding infrastructure; 3. Transition to a low-carbon economy; 4. Transforming urban and rural spaces; 5. Improving education and training; 6. Providing quality health care; 7. Fighting corruption and enhancing accountability; 8. Transforming society and uniting the nation.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	2004	<p>Section 32 - Control of dust.</p> <p>Section 34 - Control of noise.</p> <p>Section 35 - Control of offensive odours</p>
Occupational Health and Safety Act (Act No. 85 of 1993)	1993	<p>Section 8 - General duties of employers to their employees.</p> <p>Section 9 - General duties of employers and self-employed persons to persons other than their employees</p>
Madibeng Local Municipality Integrated Development Plan Review (2018/19)	2018	<p>The Madibeng Local Municipality IDP has identified poor economic climate and outlook as one of the threats to the municipality. However industrialisation and agriculture has been noted as an opportunity. It is for this reason that the proposed development has been centred towards enriching local economy through industrialisation and agriculture.</p> <p>In addition, in Ward 2, the IDP has prioritised amongst others, agriculture through Local Economic Development (LED). The LED unit ultimate outcome is increased economic growth, enhanced tourism, capacitated SMMEs and well administered economic activities.</p>



Legislation, policy and guideline	Year	Applicability to the proposed development
Bojanala Platinum District Municipality 4th Review Integrated Development Plan (2021/22-2025/26)	2021	The IDP has identified that Agriculture contributes about 2.6% of the total GDP and 19% to formal employment in the district. However, land reform has created uncertainty and discouraged investment within this sector and has resulted in many commercial farms becoming subsistence farms. The mining industry receives priority in terms of land use.



6 BASELINE DESCRIPTION

This section describes the biophysical and socio-economic environment that may be affected by the proposed development focussing on significant environmental aspects of the proposed development were consulted to describe the baseline conditions.

6.1 Geology

The study area is located within the Daspoort Formation as per **Figure 7** below. The Palaeoproterozoic Daspoort Formation forms part of the Pretoria Group on the Kaapvaal craton. This sandstone- and quartzite-dominated lithological formation covers an elliptical geographical area stretching from the Botswana border in the west to the Drakensberg escarpment in the east, with its northern limit in the Mokopane (Potgietersrus) area and Pretoria in the south; altered outliers are also found in the overturned units of the Vredefort dome in the Potchefstroom area.

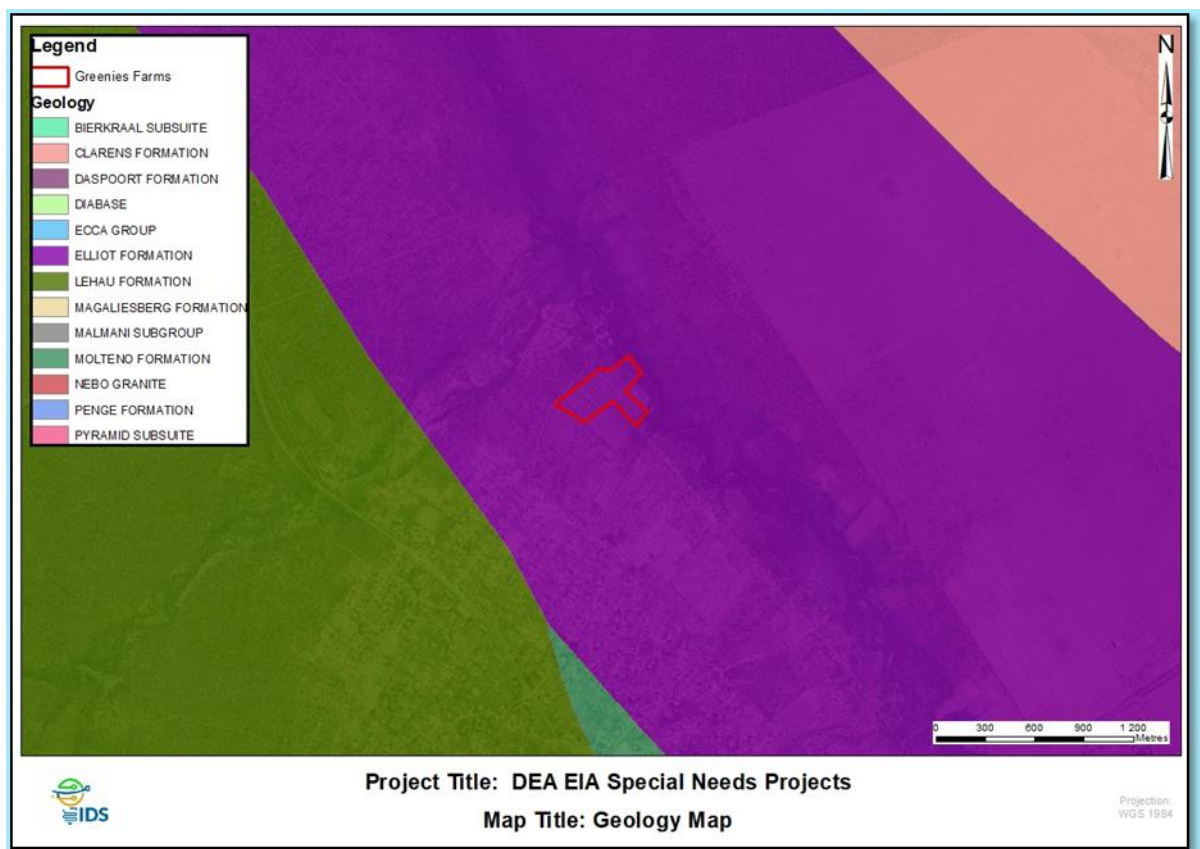


Figure 7: Geological Map of the study area

6.2 Topography

Based on **Figure 8** below the elevation profile of the study area is relatively flat at 1016m above sea level.



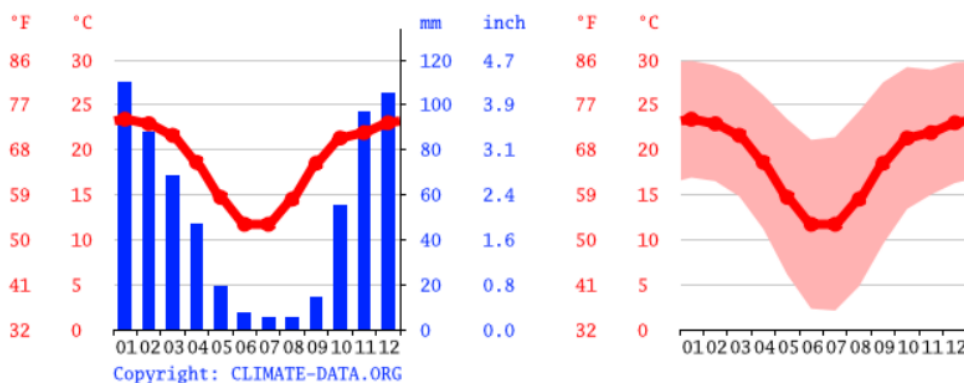


Figure 8: Elevation profile of the Study Area

6.3 Climate

The Brits lies on 1127m above sea level Brits's climate is a local steppe climate. There is little rainfall throughout the year. According to Köppen and Geiger, this climate is classified as BSh. The average annual temperature in Brits is 19.4 °C. About 629 mm of precipitation falls annually. Precipitation is the lowest in July, with an average of 3 mm. The greatest amount of precipitation occurs in December, with an average of 118 mm. At an average temperature of 23.5 °C, January is the hottest month of the year. The lowest average temperatures in the year occur in July, when it is around 12.6 °C.

Table 12: Climate of the study area



6.4 Soil

The study area is located within Ferric Luvisols which are characterised by a surface horizon depleted of clay and accumulation of clay in a subsurface "argic" horizon.





Figure 9: Soil type map

6.5 Agricultural Potential

According to the DFFE Screening Tool, the study area is within a high agricultural land indicated for subsistence farming. Subsistence farming is defined as the practice of growing crops and raising livestock sufficient only for one's own use, without any surplus for trade.

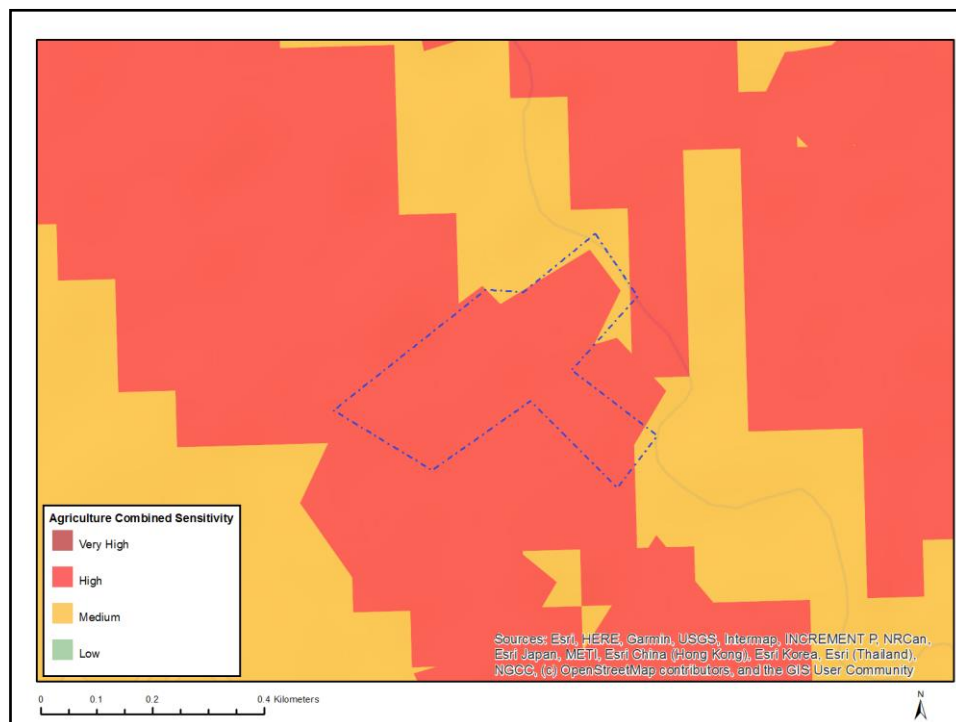


Figure 10: Agricultural Potential of the study area



6.6 Hydrology

The information below has been obtained from the Aquatic and Wetland Delineation Report attached as **Appendix G2**.

6.6.1 National Freshwater Ecosystem Priority Area Status and SAIIE Wetland Map 5

The proposed development is identified to have active riverine systems outside the farm boundary (**Figure 11**) noted to be less than 32m away from the site. In addition, the study area is located within the Tolwane River catchment on quaternary catchment A23K within the Limpopo Water Management Area.

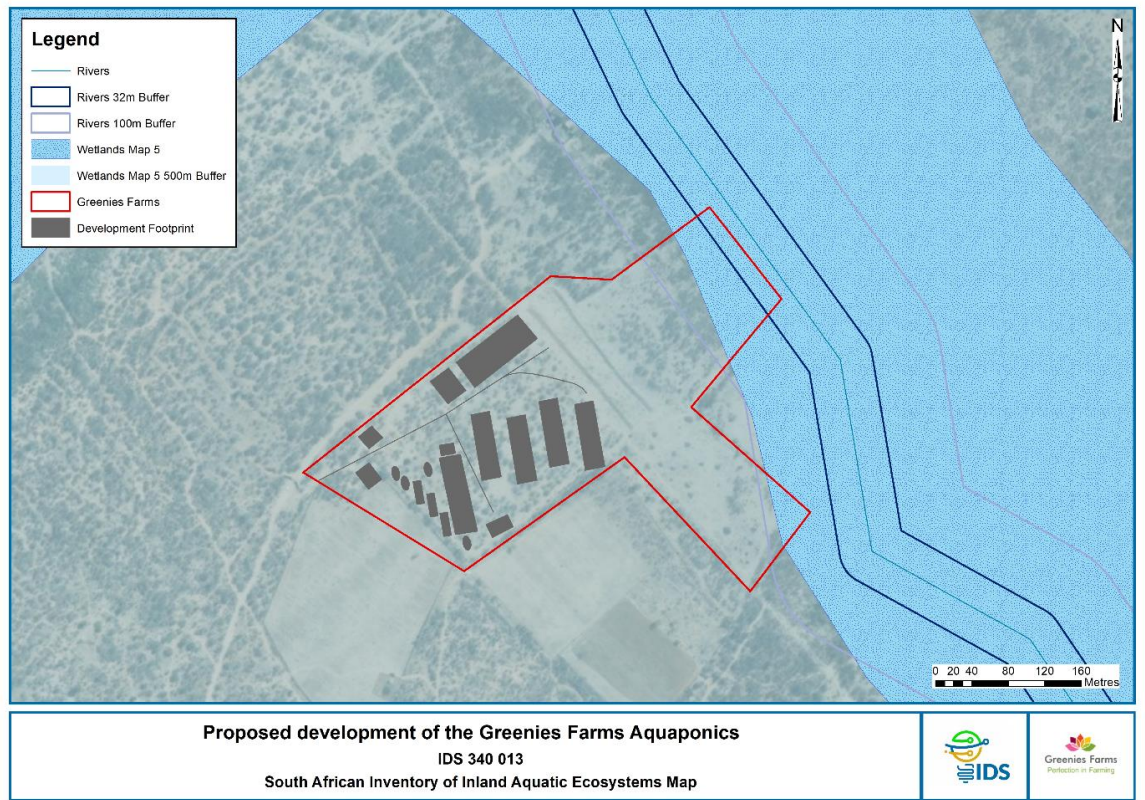


Figure 11: South African Inventory of Inland Aquatic Ecosystems Map (2018)



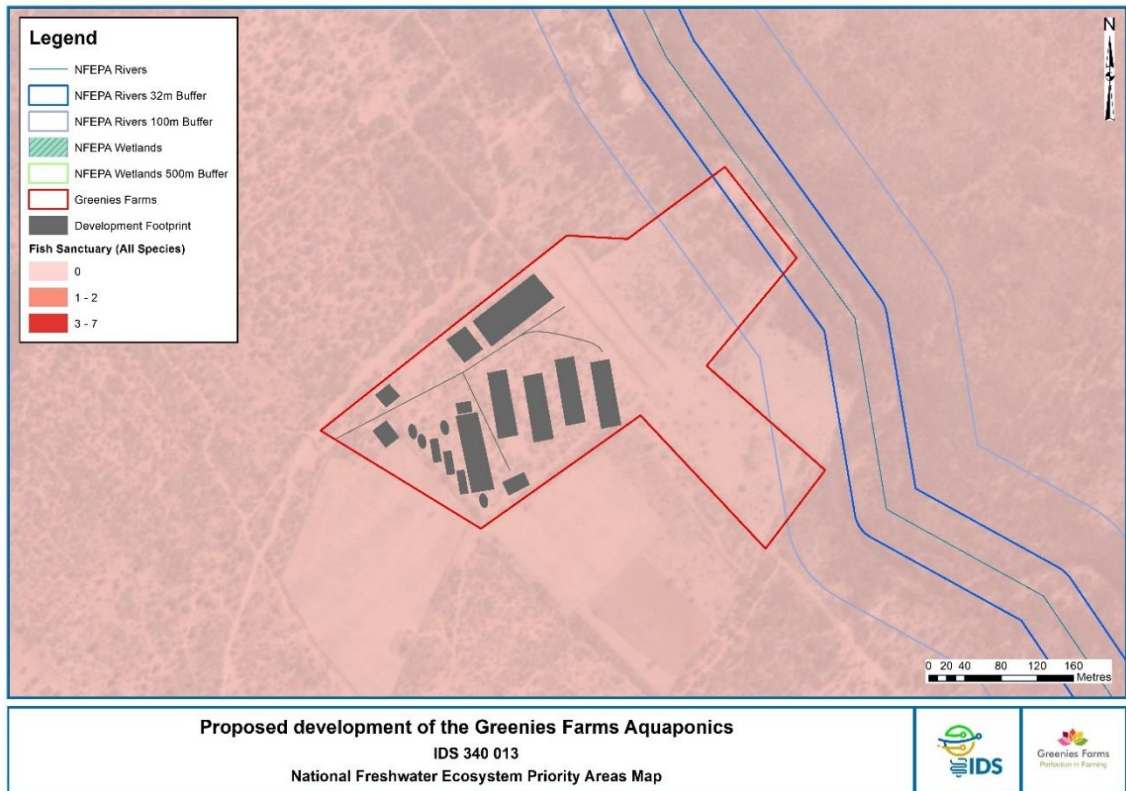


Figure 12: National Freshwater Ecosystem Priority Areas Map (2011)

6.6.2 Riverine Present Ecological Status

With reference to **Figure 11**, the study area lies along the banks of the Tolwane River. According to the Department of Water and Sanitation (DWS) PES EIS study (2014) the Tolwane river system has a **PES score of D**, which implies that the system has been **moderately modified**.

6.6.3 Aquatic Biota

An aquatic Critical Biodiversity Area (CBA) (**Figure 13**) is noted within the site as per North West Conservation Plan (2015). According to the DFFE Screening Report, the site is therefore rated as highly sensitive due to the possible presence of the aquatic CBA. Furthermore, various fish species are located within the region of the study area. These fish species include *Gambusia affinis*, *Enteromius anoplus*, *Tilapia sarrmanii*, *Pseudocrenilabrus philander* and *Oreochromis mossambicus*.



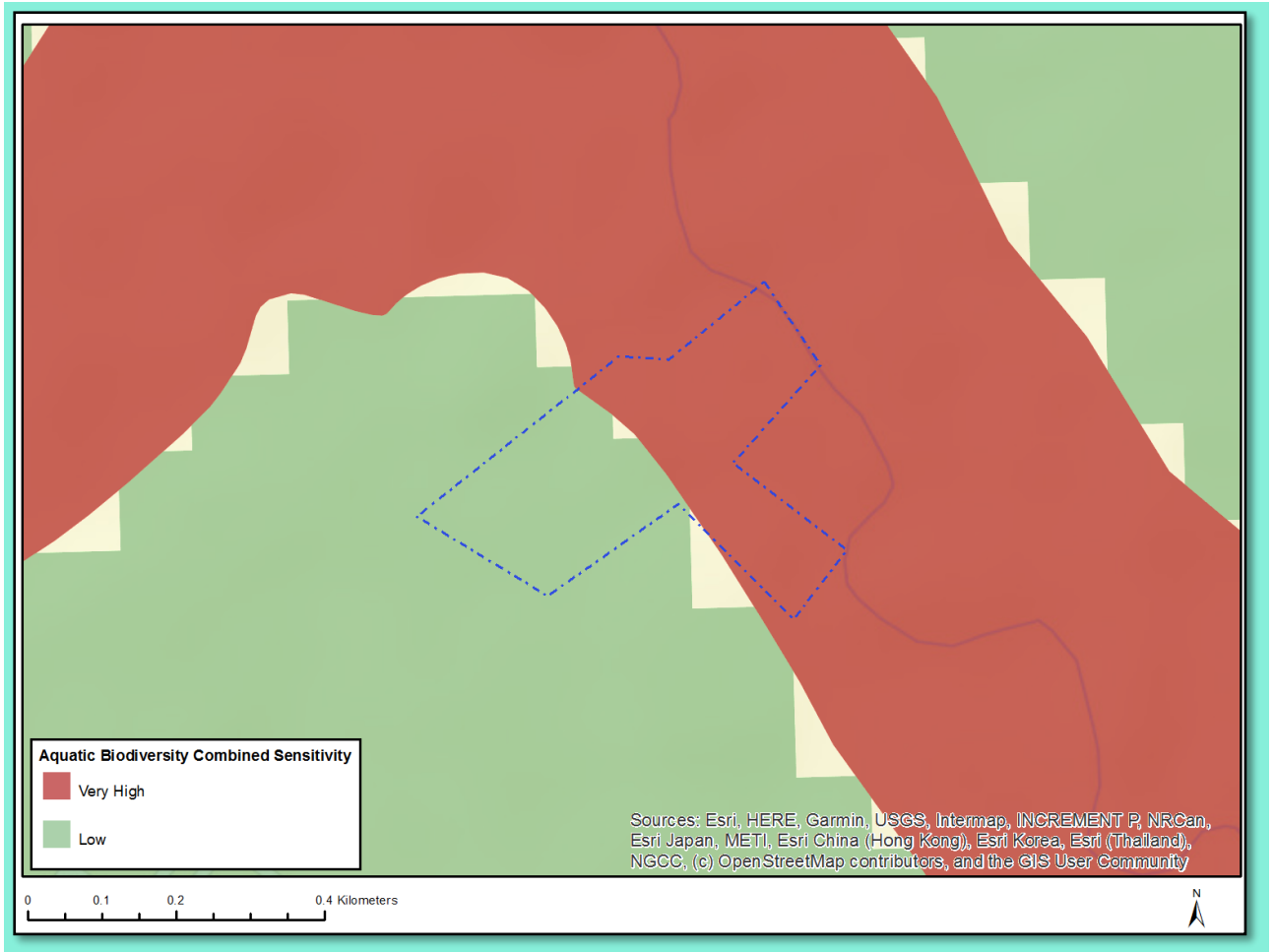


Figure 13: Aquatic Biodiversity Combined Sensitivity

6.6.4 Aquatic Assessment

6.6.4.1 Visual Observation

A photographic record of the site was taken to provide a visual record of the condition of the proposed development site observed during the field assessment survey. The photographs taken are presented below with a table summarising all the observation for different criteria that were observed during the visual assessment at Greenies Farm as shown in

Table 13.

Table 13: The visual observation that was recorded during the survey in Greenies Farm.



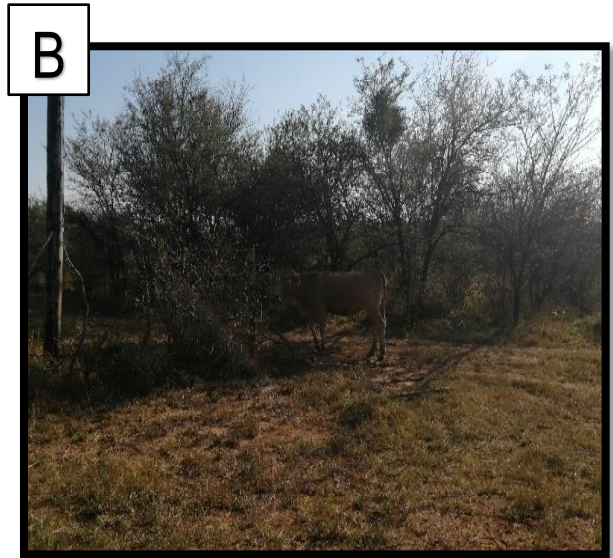


Table 14: The description and location of the visual observation made on site

Letters	Descriptions	Co-ordinates	
		Latitude (S)	Longitude (E)
A	The side bank of the river dominated by the alien plants.	25°18'34.88"S	27°48'18.03"E
B	The site is showing signs of overgrazing and being disturb. It very dry and is dominated by thorn trees. Cows were noticed on the site, and the area is used as the open space where cows feed.	25°18'28.35"S	27°48'7.36"E
C	The proposed site was used for farming previously this can be seen from the ploughing observed on the site.	25°18'28.75"S	27°48'8.15"E
D	On the riparian zone next to the river, littering was noticed. This shows that they are people who come here.	25°18'34.75"S	27°48'17.34"E
E	The depression was noted on the site.	25°18'33.01"S	27°48'12.75"E
F	The river showing sand deposits in the middle.	25°18'35.05"S	27°48'17.92"E

Table 15: Description of the location of the assessment site during the measurement of physicochemical water properties

Factors	Greenies Farm
Erosion potential	There is some potential for erosion in high flow conditions due to the steep and incised nature of the banks at this point.
Riparian zone characteristics	The riparian zone is in relatively in good condition at this point with mainly natural vegetation occurring. It mostly dominated by grasses, shrubs, and trees.
Algal presence	Some algal proliferation was observed at the site.
Flow condition	The flow was very slow at this point.
Depth characteristics	The stream consisted of shallow pools.
Visual indication of the impact on aquatic fauna	Some instream sedimentation and erosion were observed on a site.
Water clarity	Water is clear
Water odour	None

6.6.4.2 *In situ* Water Quality

The *in situ* water quality analyses was conducted on the site and water quality results are shown in

The *in situ* water quality that was conducted on the Tolwane River indicates good water quality conditions and does not present adverse conditions to local aquatic biota. The water temperature, pH, DO, TDS, and conductivity values are well within the TWQR that was stipulated by DWAF (1996). This is further justified by the presence of macroinvertebrate such as Synlestidae and Baetidae which are known to be sensitive to pollution and prefer unpolluted water with high DO and low siltation. Therefore, it can be concluded that in terms of water quality for the river system, good results are obtained based on the physico-chemical water parameters collected during the study.

Table 16. The water quality results are important since they provide information regarding the state of water due to the direct impact water quality has on the aquatic organisms.

The *in situ* water quality that was conducted on the Tolwane River indicates good water quality conditions and does not present adverse conditions to local aquatic biota. The water temperature, pH, DO, TDS, and conductivity values are well within the TWQR that was stipulated by DWAF (1996). This is further justified by the presence of macroinvertebrate such as Synlestidae and Baetidae which are known to be sensitive to pollution and prefer unpolluted water with high DO and low siltation.



Therefore, it can be concluded that in terms of water quality for the river system, good results are obtained based on the physico-chemical water parameters collected during the study.

Table 16: Water parameters recorded during survey at Greenies Farm with TWQR as stipulated by DWAF (1996)

Variables	Levels			TWQR	TWQR
	WQ1	WQ2	Average	(Aquatic)	(Aquaculture)
Temperature (°C)	17.3	17.7	17.5	-	14-18
pH	7.72	7.7	7.71	6.5-8.5	6.5-9
DO (mg/l)	5.6	5.8	5.7	5-8	5-8
TDS (ppm)	256	265	260.5	<450	<450
Conductivity (mS.m ⁻¹)	523	530	526.5	-	-
Salinity	0.56	0.55	0.56	-	<2

6.6.4.3 Habitat Assessment

The results of the IHIA instream and riparian assessment of the Tolwane river in quaternary catchment A23K are presented in Table 17 and Table 18 below. The assessment is based on a 5km baseline assessment of the river.

Table 17: The results of the IHIA instream and riparian assessment of the Tolwane River

Instream Assessment	Average Score	Impact	Weighted Score	
Water abstraction	8		4,7	
Flow modification	10		5,2	
Bed modification	12		6,1	
Channel modification	12		6,1	
Water quality	12		6,5	
Inundation	10		4,0	
Exotic macrophytes	10		3,6	
Exotic fauna	10		3,2	
Solid waste disposal	10		2,4	
Total Instream	58,3		Class	D

Table 18: The results of the IHIA instream and riparian assessment of the Tolwane River

Riparian Assessment	Average Impact Score	Weighted Score	
Indigenous vegetation removal	15	7,8	
Exotic vegetation encroachment	15	7,2	
Bank erosion	12	8,4	
Channel modification	15	7,2	
Water abstraction	8	5,2	
Inundation	15	6,6	
Flow modification	10	4,8	
Water quality	10	5,2	
Total Riparian	47,6	Class	D

According to the IHIA results, the instream and riparian habitat integrity of the Tolwane River system is **class D**. Therefore, the system is **largely modified**. This modification can be attributed to sedimentation of the instream habitat upstream of the study area which could be resulting from sand mining by the local community. It is noted that there are settlements and



agricultural holdings upstream which may discharge water with high mineral content. The modification of the riparian area is largely due to the overgrazing of indigenous species, leading to the dominance of exotic alien species along the riverbanks as shown in

Table 13.

6.6.4.4 Aquatic Macroinvertebrates

Macroinvertebrate Habitat

The habitats availability within the assessed site was rated as F, this indicate poor biotope diversity with the reach that was assessed (Table 19). This low biotopes score can be attributes to the low diversity of stones, bedrock, marginal vegetation in current, gravel and mud. The high diversity of aquatic vegetation and marginal vegetation out of current biotopes indicates the macroinvertebrate assemblage with a high preference for these biotopes would be expected. The biotopes results indicates that the habitats availability may be a limiting factor to the macroinvertebrates that were observed on site, particularly those species that prefer area that were not present on the assessed site such as stones and bedrock.

Table 19: Biotope score during the Greenies Farm survey (May 2021)

Biotope	Rating (0-5)
Stones in current	0
Stones out of current	0
Bedrock	0
Aquatic Vegetation	3
Marginal Vegetation in Current	0
Marginal Vegetation Out of Current	3
Gravel	0
Sand	2
Mud	0
Biotope Score	8
Biotope Category (Tate and Husted, 2015)	F

South African Scoring System

The aquatic macroinvertebrate results that were obtained during the survey at Greenies Farm are present in the table below (Table 20). The SASS5 scores that were recorded during the survey was 88, with an Average Score Per Taxon (ASPT) of 4.2, this indicate that the taxa that was collected during the survey were tolerant (>5 sensitivity score).

Table 20: The biotopes specific summary of the results obtains during the survey in Greenies Farm from the application of the SASS5 index.

Aspect	Site
SASS5 Score	88
No. of Taxa	21
ASPT	4.2
Category (Dallas, 2007)	B

Based on the data obtained during the survey for Greenies Farm. All aquatic macroinvertebrate species were found on the vegetation biotopes only. None was found in the stone and the GSM biotopes. This is due to the fact that the river had no stones and gravel biotopes. The water level in the river was less than 0.5m deep and the river had a diameter of approximately 5m wide with sand deposit. The biotic integrity based on the biological bands for the Highveld by Dallas (2007), was categorised as being largely natural with few modifications (Class B) (Table 20).



The present of marginal vegetation diversity contributed to the diverse Hemiptera taxa collected, increasing the total sensitivity score. Numerous taxa were absent from the site, this includes the *Trichoptera* which is regarded as a key taxa since it is highly sensitivity to pollution. This is due to the absent of the diverse stone's biotopes in the assessed site. Furthermore, more species of *Coenagrionidae* and *Hemiptera* species were collected during the study.

6.6.5 Wetland Assessment

6.6.5.1 Wetland Delineation and Description

A wetland system was noted within the site. It is located toward the southeast part of the development footprint. The wetland Hydrogeomorphic (HGM) unit could be described as a depression wetland (**Figure 14**) as stipulated by Ollis *et al* (2013). This wetland is within 150 meters of the Tolwane River on a relatively flat area, the system acquires water from rainfall and runoff during high volume rainfall periods. The delineated wetland is illustrated in **Figure 15**.

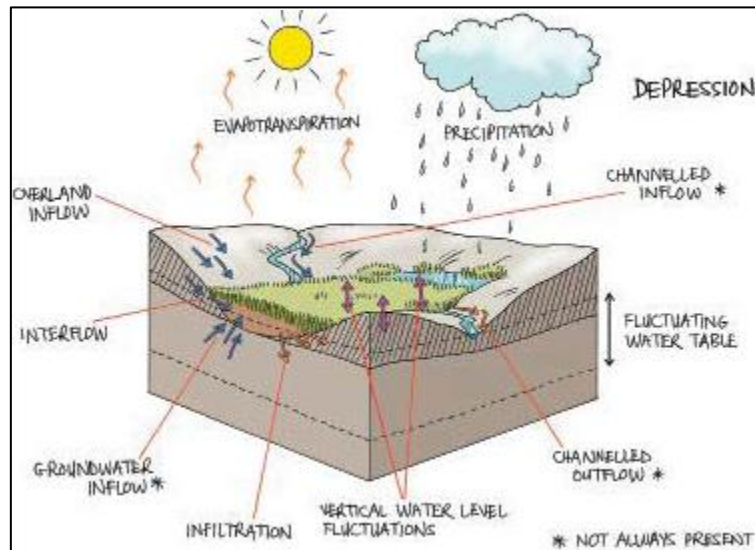


Figure 14: Illustration of a depression wetland system



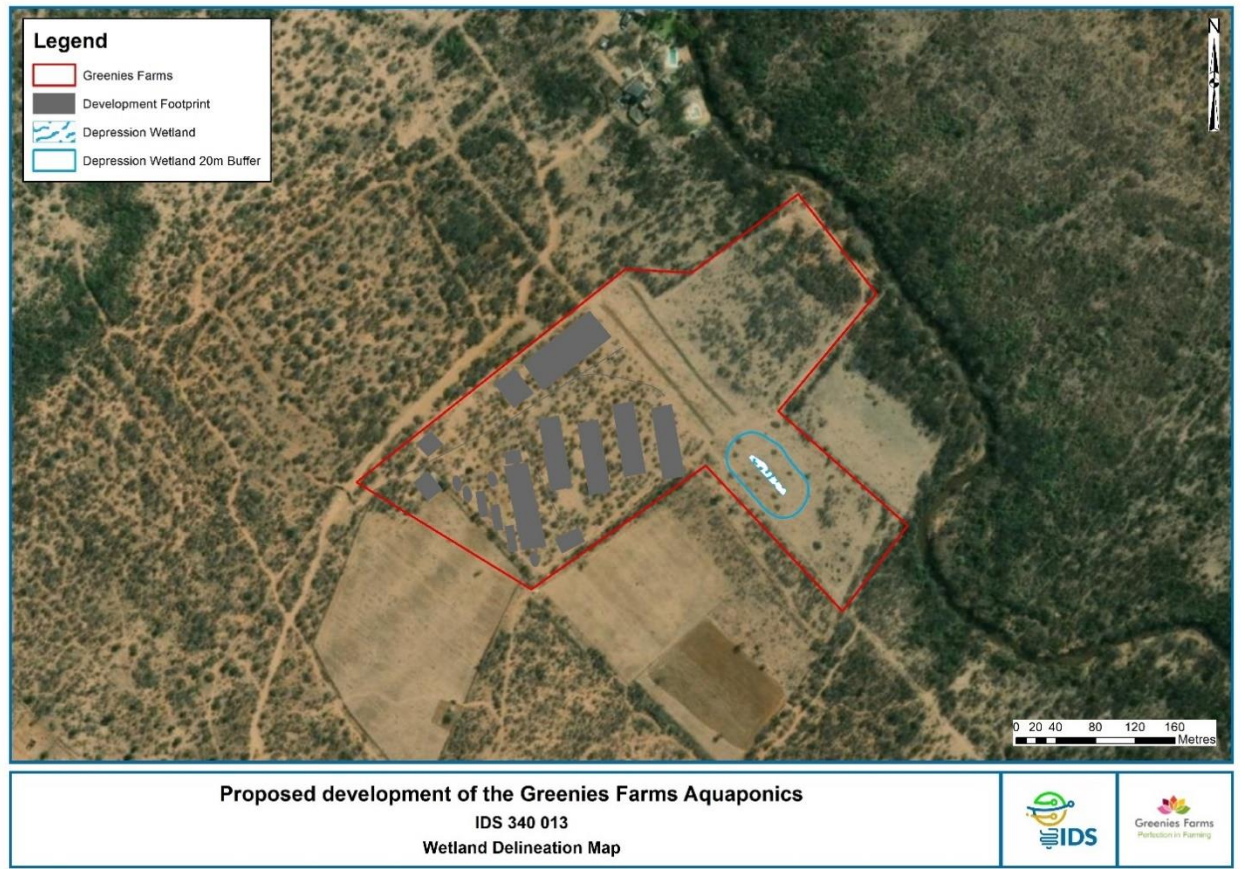


Figure 15: Wetland Delineation Map

6.6.5.2 Wetland Indicators

According to DWAF (2005), wetland delineation is conducted based on 4 main criteria, Terrain Unit, Soil Wetness, Soil Form, and Hydrophytic vegetation. An assessment of the depression wetland based on the stipulated criteria was performed and is discussed below.

Terrain Unit

The Wetland system lies at the bottom of the Tolwane River catchment system, water inputs originate from surface inflows during rainfall events and rainfall retention. The area is relatively flat on the valley floor.

Hydromorphic soils

Hydromorphic soil presence is considered to be a highly accurate measure in delineating wetlands (DWAF, 2005). The soil around the wetland system was sampled to 500 mm, as per DWAF (2005) guidelines to assess soil wetness and the presence of hydromorphic soil forms. 100 mm bucket auger samples were extracted from the soil for analysis. The delineated wetland area was dominated by Rensburg soil form, with a Vertic A horizon that constitutes of high clay content. The soils have a dark colour and blocky structures illustrated in **Table 21** (Soil Classification Working Group, 2018).

Furthermore, the soils were bleached on the surface and prominent orange mottles were present in large quantities. The frequency and prominence of these mottles reduced at lower depths. The soils also became increasingly darker and consisted of a higher clay content. The soil texture became smoother at depth and the structure of the soils became rather blocky.

Table 21: The hydromorphic soil characteristics found on the proposed development site.



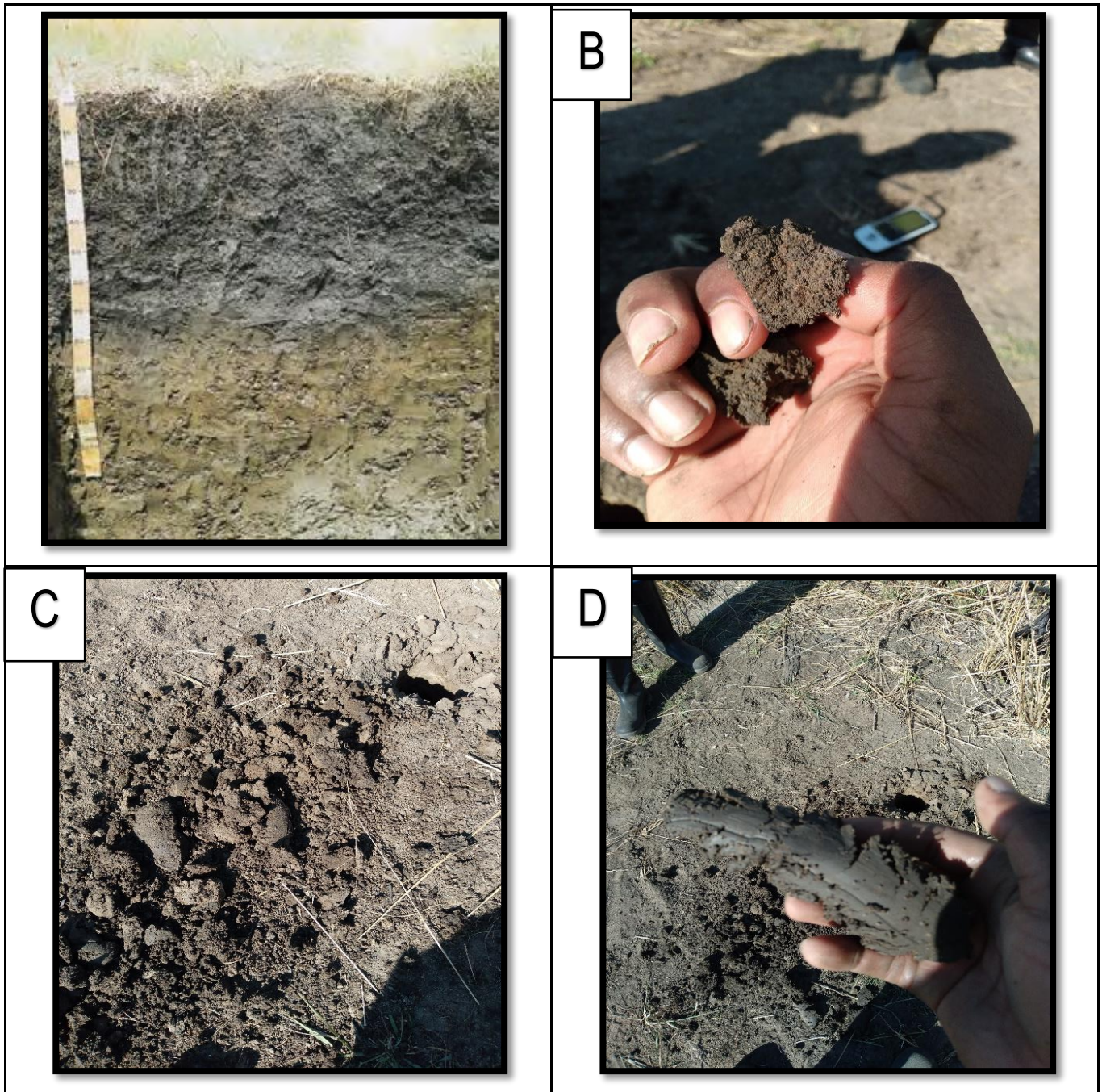


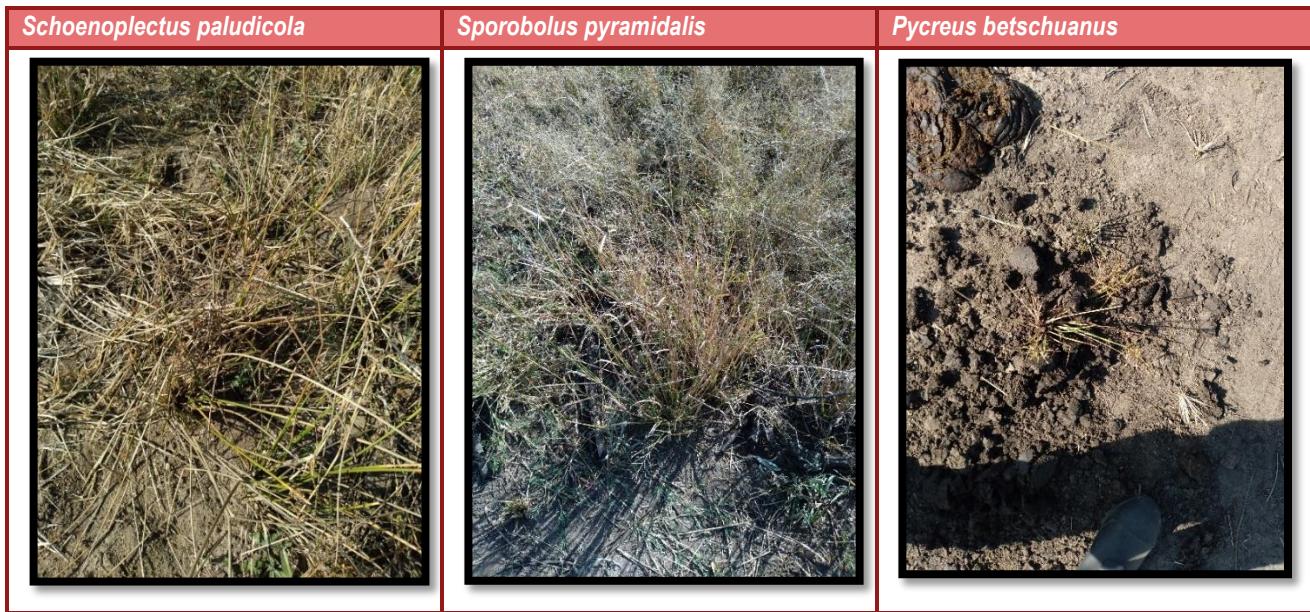
Image references: A: A Rensburg soil form profile (van der Waals, 2019); B: Mottling in wetland soil; C: Auger soil sample; D: Soil structure of wetland soil at 500mm depth.

Hydrophytes

Hydrophytes are also indicators of wetland conditions and can be used to identify and delineate wetland systems. The delineated wetland has hydrophytic species such as *Schoenoplectus paludicola*, *Sporobolus pyramidalis*, *Pycreus betschuanus*. (Table 22).



Table 22: Hydrophytic vegetation in the delineated wetland



6.6.5.3 Wetland Ecological Functional Assessment

The ecosystem services that may be provided by the wetland system are measured through the Wet-EcoServices model. The model evaluates both ecological and social benefits, these are further categorized as direct and indirect services. **Table 23** shows the wetland functional assessment scores for the delineated wetland.

Table 23: Wetland Ecological Functional Assessment of the proposed development site

		Ecosystem Service	Score
Indirect Benefits	Regulating and Supporting Services	Flood attenuation	0
		Stream flow regulation	0,3
		Sediment trapping	0,8
		Erosion control	0,4
		Phosphate assimilation	0,7
		Nitrate assimilation	0,3
		Toxicant assimilation	0,5
		Carbon storage	1,2
		Biodiversity maintenance	1,7
Direct Benefits	Provisioning Services	Water for human use	0,4
		Harvestable resources	1,0
		Food for livestock	1,0
		Cultivated foods	2,9
	Cultural Services	Tourism and Recreation	0,0
		Education and Research	1,5
		Cultural and Spiritual	2,0

6.6.5.4 Ecological Health Assessment

The Present Ecological State, as defined by Kotze *et al.* (2009) was assessed using the revised Wet-Health tools stipulated by Kotze *et al.* (2020) and the results are in **Table 24** below.



Table 24: The Present Ecological State of the proposed development site as define by Kotze *et al.* (2009)

Wetland	Hydrology		Geomorphology		Vegetation	
HGM 1	Impact Score	Ecological Category	Impact Score	Ecological Category	Impact Score	Ecological Category
	9.5	F	9.6	F	8.4	F
Overall PES Score	9.4		Overall Ecological Category		F	

The Hydrology of the depression wetland is regarded as critically modified due to overgrazing and trampling by livestock. The area around the wetland system has evidence of extensive grazing, water inputs are largely from rainfall and runoff from adjacent land. However, due to the extensive grazing in the vicinity of the wetland and within the wetland, vegetation loss has reduced the ability of the system to retain water. This is also aggravated by the high clay content soils that constitute the wetland which has low permeability.

The geomorphology of the area around the wetland system has two main disturbances as there is evidence of plowing about 10 meters from the western edge of the wetland. Furthermore, there is a powerline and access road 13 meters from the wetland which has altered flow paths of runoff into the system.

The vegetation component is also critically modified due to overgrazing and evidence of burning within the wetland. The livestock in the area feed extensively on the vegetation in the wetland and trample on the vegetation as there is cow dung and tracks within the wetland. There are still hydrophytic species within the wetland, but most have been eaten by the cattle. There is the encroachment of exotic species such as *Sporobolus pyramidalis*, which are indicative of overgrazed wetland systems.

6.6.5.5 Ecological Importance and Sensitivity

Moderate EIS and human benefits scores have been noted for the delineated wetland as it is situated within an area identified as an aquatic CBA (Table 25). Furthermore, the area around the wetland is utilised for grazing by the local community. However, the wetland system has low hydrological scores as it is an ephemeral wetland system, and it is located in clay soils with low infiltration capacities.

Table 25: The Ecological Importance and Sensitivity of the proposed development site

Wetland Importance & Sensitivity	EIS Score
Ecological importance and sensitivity	1.2
Hydrological/functional importance	0
Direct human benefits	1.4

6.6.5.6 Buffer Requirements

Buffer zones have been implemented as protected areas to prevent any ecological damages and loss of natural resources that may result from different land uses. In order to protect the delineated wetland system within the study area, a buffer has been prescribed to mitigate any damage resulting from the proposed development. As per DWS regulations, a 500m regulated area buffer must be placed around the wetland system. However, the result of the DWS buffer tool as developed by Macfarlane *et al* (2014) and Macfarlane and Bredin (2017), a 20 m buffer is recommended for the delineated wetland system.

6.7 Biodiversity

The information below has been obtained from the Terrestrial Assessment Report attached as **Appendix G3**.

6.7.1 General Land Cover

The current General Land Cover of the project site was assessed using Google Earth, along with historical areal imagery. The imagery revealed a large proportion to be previously cultivated land, a farmhouse building infrastructure, and a wetland within the boundary of the project site.

As depicted in **Figure 16** below, the land is covered by cultivated land, forested land and wetlands. The farm is however dominated by cultivated land (95.06%)



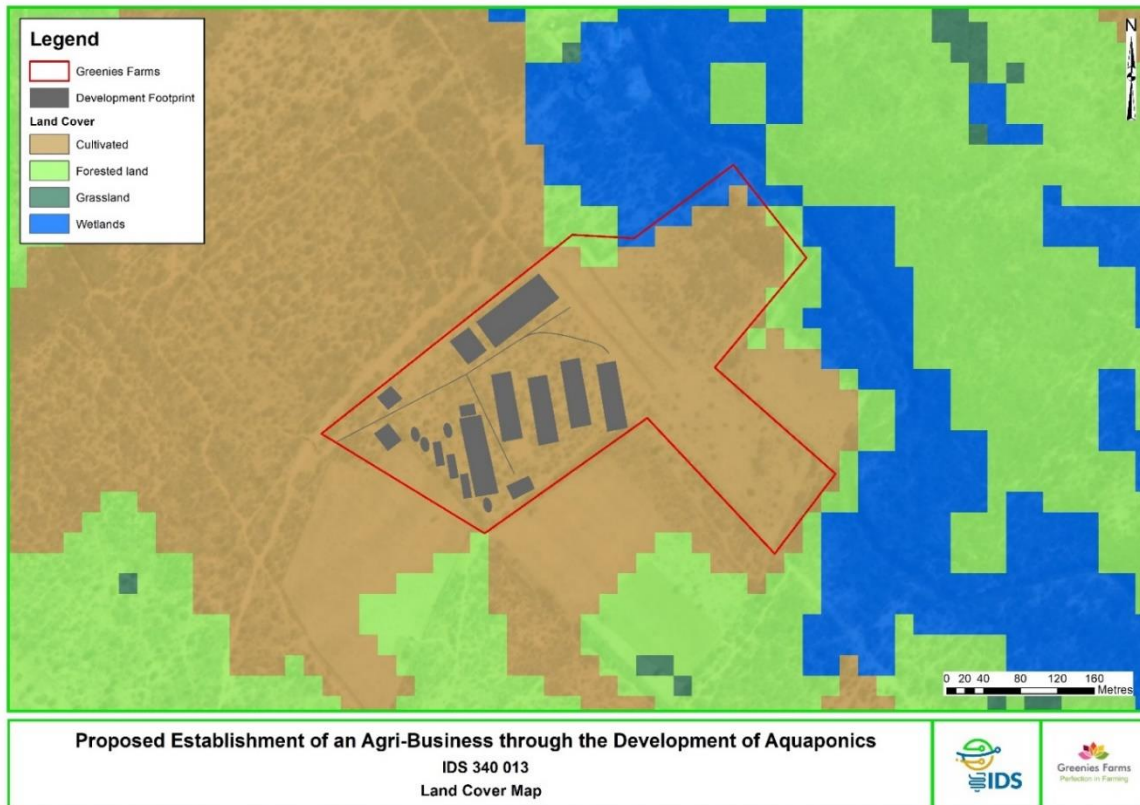


Figure 16: Land cover map (2018)

6.7.2 Critical Biodiversity Areas

A scientific methodology is followed, to identify Critical Biodiversity Areas with the country. These areas are required to meet set biodiversity targets in terms of maintaining ecosystems, species and the ecological process which occur in these areas. These areas are including both in the terrestrial and aquatic environment. The aim of the identification of Critical Biodiversity Areas is for informed decision-making, with regards to suitable development areas. A variety of land use sectors, who hold environmental authorizations authority which may affect the biodiversity of the environment in those areas. These Critical Biodiversity Areas are identified usually at provincial level, in map formats, as part of the provincial spatial biodiversity plan (South African National Biodiversity Institute, 2021). According to the DFFE Screening Tool, an aquatic CBA and ESA is noted within the site, resulting in a very high sensitivity towards aquatic biodiversity.



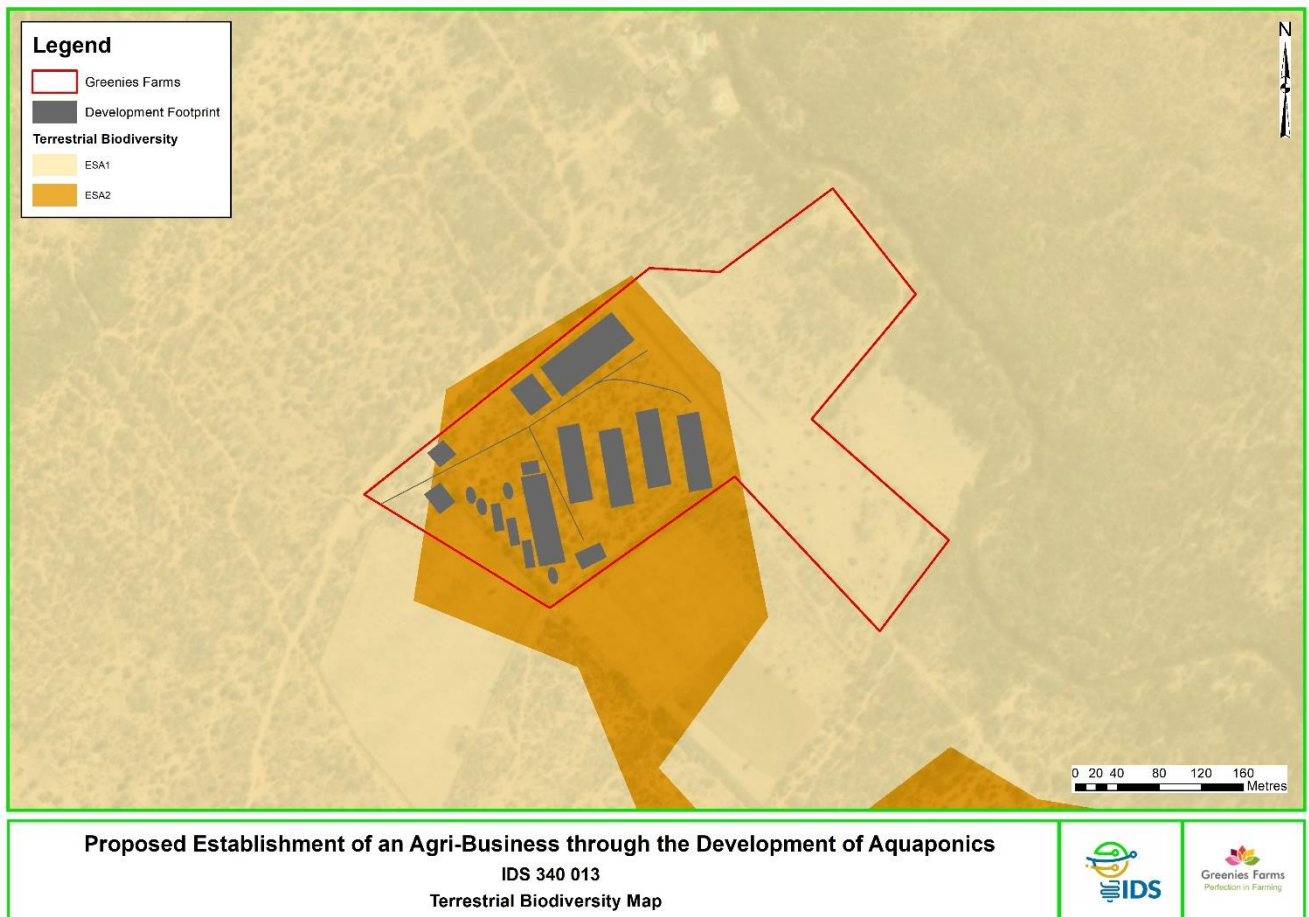


Figure 17: Biodiversity map (2015)

Based on **Figure 17** above, the proposed study area falls within an Ecological Support Area (ESA). The study area is dominated by an ESA 2, while the north-eastern and western portions of the site is within an ESA 1. The table below (**Table 26**) depicts the percentage cover the Ecological Support Areas (ESA's) in relation to the farm boundary.

Table 26: Percentage cover of Ecological Support Areas (ESA's)

Terrestrial Biodiversity	Hectares (ha)	Percentage Cover
Ecological Support Area 1 (ESA1)	4.42	49.61
Ecological Support Area 2 (ESA2)	4.49	50.39

6.7.3 National Biodiversity Assessment

The National Biodiversity Assessment (NBA) is an output of South Africa's biodiversity status, from a multitude of data sources, and comes in a variety of formats including seven technical reports, a synthesis report, datasets, and a book, amongst many other formats. The aim of the book is to inform decision-making sectors, inform the policy drafting process and to add value towards the national development priorities. The NBA can be used as a tool, to monitor and produce quantifiable trends of South Africa's biodiversity state. The latest release of the NBA was in the year 2019, ending its assessments period in the year 2018, which was a period which lasted 5 years, from 2015 (South African National Biodiversity Institute, 2019).

6.7.3.1 Ecosystem Threat Status

Included in the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA), a list of threatened or protected ecosystems is created. The initial list to be provided was gazette on the 9th of December 2011. The aim of creating such a list is towards conservation efforts of such ecosystems, and to prevent their further degradation. The list is further



classified under various categories, namely; critically endangered (CR), endangered (EN), vulnerable (VU), least threatened (LT) or protected (Threatened Ecosystems, 2021).

As depicted in **Figure 18** below, the entire extent of the project area is within a vulnerable ecosystem, which is an ecosystem which has a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems.

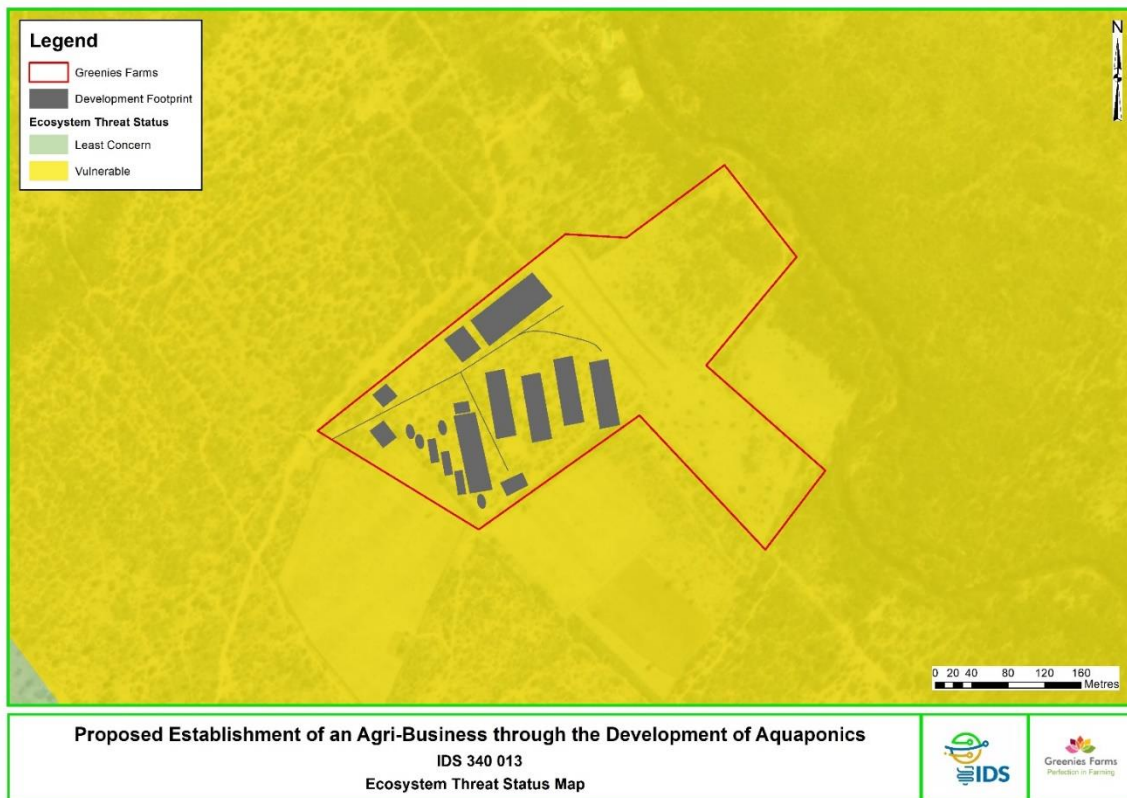


Figure 18: Ecosystem threat status map (2018)

6.7.4 Ecosystem Protection Level

The National Environmental Management: Protected Areas Act (Act 57 of 2003) stipulates national lawfully restricted areas, as protected areas, according to various categories, such as nature reserves, national parks, and protected environments. The Ecosystem Protection Level is determined by the proportion the ecosystem type which falls within a protected area, and that is compared against the set biodiversity target for the ecosystem type, which then determines the protection level. The protection levels are further classified into categories, based on their protection level proportions, where the biodiversity targets and completely met in a protected area, the ecosystem type is categorized as “well protected”. Where the ecosystem type has more than 50% proportion for the biodiversity targets to be met, it is categorized as “moderately protected”; where the ecosystem type has a proportion between 5-49%, it is categorized as “poorly protected”; and in ecosystem types where there is no proportion which falls within a protected area, or the proportion is 5% or less of the biodiversity target met in a protected area, the ecosystem type is categorized as “no protected” (Driver, Daniels, Helme, Lotter, & Raimondo, 2012).

As depicted in **Figure 19** below, the project area is within a poorly protected ecosystem. These ecosystems often occur in production landscapes where options for formal protection through the protected area network are reduced.



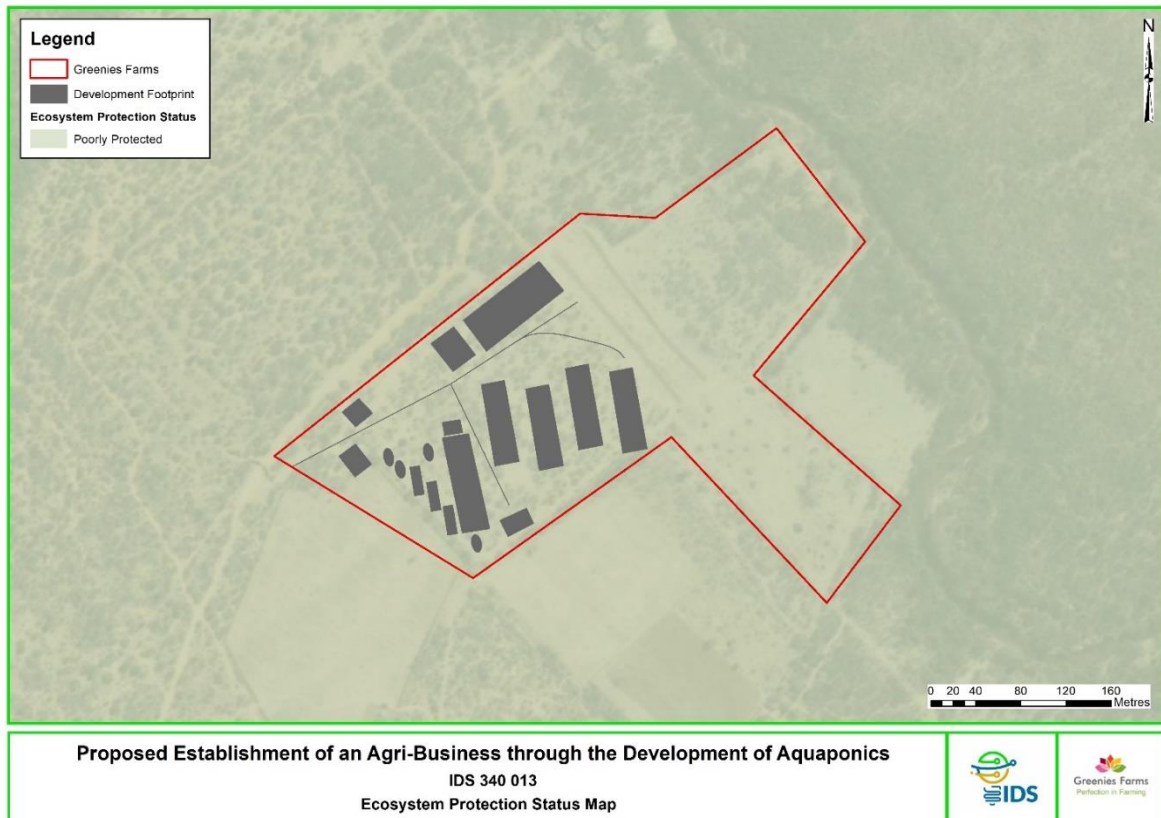


Figure 19: Ecosystem protection status map (2018)

6.7.5 South African Conservation Areas and Protected Areas

The South African Protected Areas Database (SAPAD) and the South African Conservation Areas Database (SACAD) is Geodatabase, which contains the different layers of Protect and Conservation areas within South Africa, also including private protected areas. This database has a lifecycle of a quarterly basis per year. Both categories of SAPAD and SACAD make up the database of Protected and Conservation Areas (PACA) Database.

The Protected areas are categorized into the following area types:

- National Parks;
- Nature Reserves;
- Special Nature Reserves;
- Mountain Catchment Areas;
- World Heritage Sites;
- Protected Environments;
- Forest Nature Reserves;
- Forest Wilderness Areas; and
- Marine Protected Areas.

The map below indicates that the project site does not fall within any national protected areas (**Figure 20**).





Figure 20: South African Protected Areas Database map (2020)

Conservation Areas are categorized into the following area types:

- Biosphere Reserves;
- Conservation; and
- Botanical Gardens.

The map below indicates that the project area does not fall within any national conservation area (Figure 21).





Figure 21: South Africa Protected and Conservation Areas Database map (2020)

6.7.6 National Freshwater Ecosystem Priority Areas (NFEPA)

NFEPA is project which involves multiple stakeholders, such as; CSIR, SANBI, WRC, DWS, DFFE, WWF, SAIAB, and SANParks. The project was set up meet two basic aims, which are: identifying Freshwater Ecosystem Priority Areas, which are part of the National Biodiversity goals for freshwater ecosystems; and to develop a reference for effective implementation of measures for the management and protection of Fresh Water Ecosystem Priority Areas, and rivers. Systemic Biodiversity Planning is used to identify priorities of conservation for South Africa's freshwater biodiversity, while still upholding equality for social and economic development. The NFEPA products include shapefiles, which are rivers, wetlands, and fish layers, the metadata document for the layers, and static maps (South African National Biodiversity Institute, 2011).

Fish sanctuary and the associated sub-quaternary catchments are rivers, which are noted as being important for protecting threatened and near threatened freshwater fish species, which are indigenous to South Africa. The main aim of Freshwater Ecosystem Priority Areas is to conserve the fish species, which are listed as threatened or near threatened, and prevent their extinction, and also to conserve the fish populations from being listed as threatened. To meet this aim, the function of NFEPA is to prevent degradation of river systems, and the associated habitats of fish species (Nel, et al., 2011). For the project site location, it does not fall within any buffer zones of a fish sanctuary. The Tolwane River is located at 15.5 m and 10 m from the boundaries of the project site. Therefore, two buffer zones fall within the project site, in terms of the 32 m and 100 m buffers of NFEPA Rivers (Figure 22).



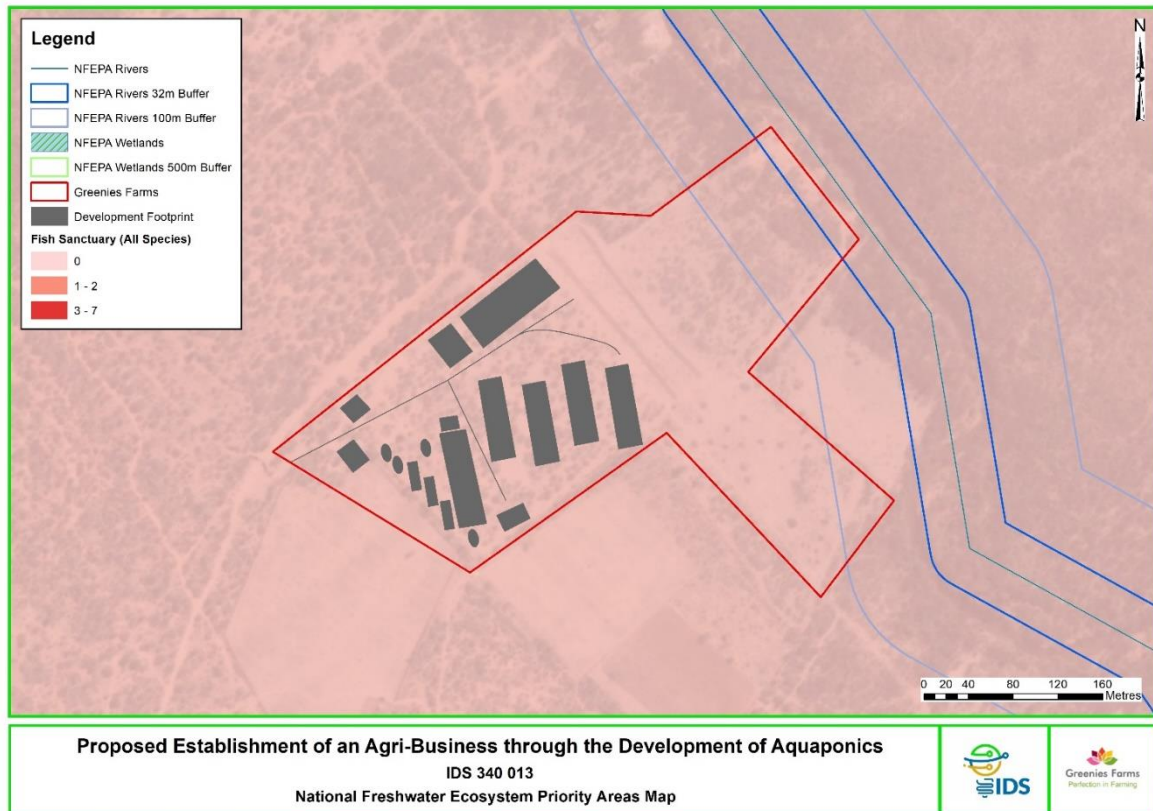


Figure 22: National Freshwater Ecosystem Priority Areas project map (2011)

6.8 Vegetation

The project site is located within the Central Bushveld Bioregion. The vegetation type is Savanna Biome. South Africa's Savanna Biome is mapped according to the vegetation structure, as well as the environmental conditions, specifically; rainfall seasonality, and the subtropical thermal regime with little to no incidence of frost. The Savanna Biome does not occur on high altitudes and is found on altitude ranges 1 500 m to 1 800 m, on highveld portions along the southern region of the Central Bushveld (Mucina & Rutherford, 2006).

The structure of the vegetation is mostly dominated with an herbaceous layer, of grass species and a discontinuous to open tree layers. The dominance of each layer component, grades the Savanna type, such as; "Savanna grasslands" to "tree savanna", "shrub savanna", "savanna woodland" or "savanna parkland". Fire is an important natural event for the Savanna vegetation type, for the grass layer to dominate. This can be categorized as maintenance of the woody plants layers, where it reduces the rate of bush encroachment for moist savannas, and for arid savannas, it maintains the height of the trees and shrubs at a height which still allows for the browsing fauna to reach.

6.8.1.1 Vegetation Types

The project site falls within the SVcb 15 Springbokvlakte Thornveld vegetation unit (South African National Biodiversity Institute, 2018), which is depicted in **Figure 23** below.



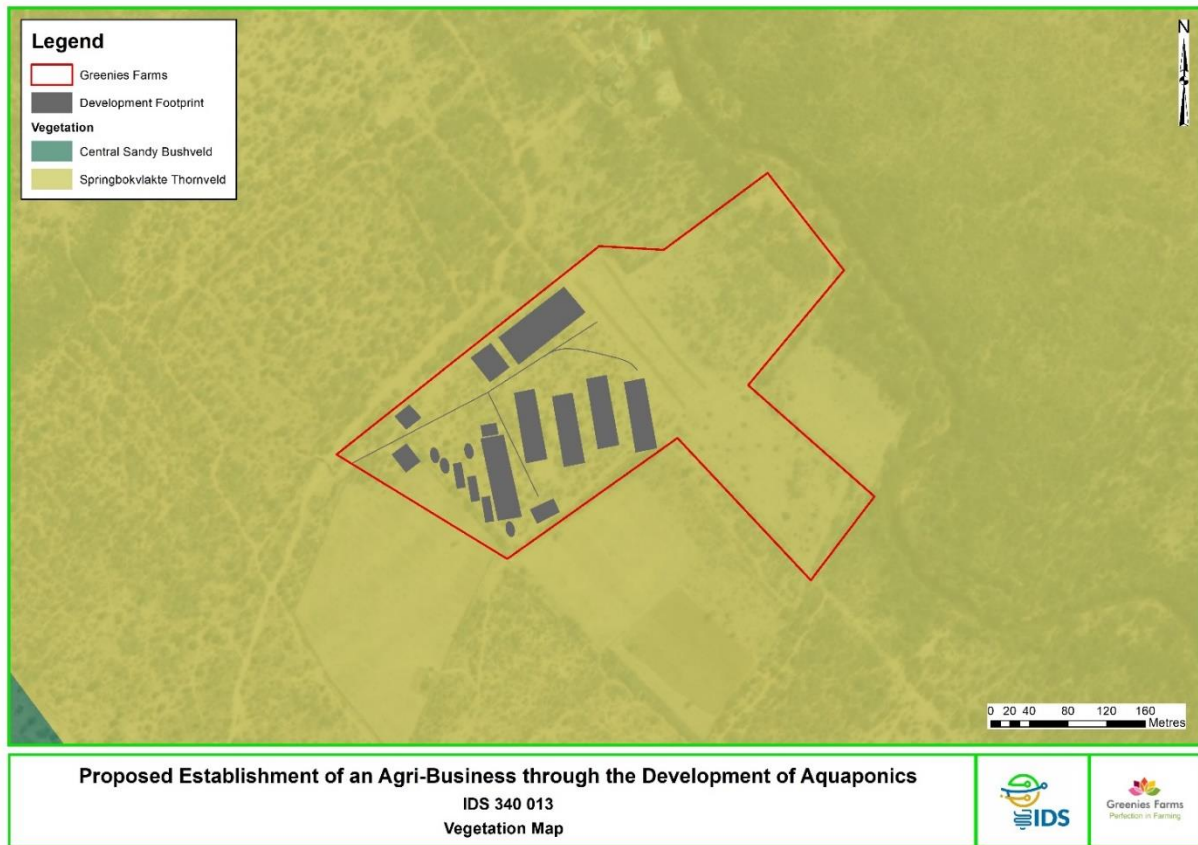


Figure 23: Vegetation map (2018)

SVcb 15 Springbokvlakte Thornveld

The distribution of the vegetation unit is located in Limpopo, Mpumalanga, North-West, and Gauteng Provinces. Within the Gauteng Province, it spreads across flats from Zebediela in the northeastern region, to Hammanskraal and Assen in the southwestern region, and Bel-Bela and Mookgophong in the northwest to Marble Hall and Rust de Winter in the southeastern region. It occurs on altitude ranges from 900 m to 1 200 m.

The vegetation and landscape features are mainly dominated by open to dense, low thorn savanna, and the landscape is dominated by Acacia species, or shrubby grassland with a low shrub layer. The landscape is mostly flat, with gently undulating plains.

6.8.1.2 Important Plant Taxa

The important taxa consist of vegetation species which are found to dominate a vegetation type, frequently occurring or being prominent in the landscape (Mucina & Rutherford, 2011). For the SVcb 15 Springbokvlakte Thornveld vegetation unit, the following species are considered important plant taxa:

Table 27: Species composition of the SVcb 15 Springbokvlakte Thornveld vegetation unit

Dominant taxa	Species list
Small Trees:	<i>Vachellia karroo</i> (=Acacia karroo) (d), <i>A. luederitzii</i> var. <i>retinens</i> (d), <i>A. mellifera</i> subsp. <i>detinens</i> (d), <i>A. nilotica</i> (d), <i>Ziziphus mucronate</i> (d), <i>Verchellia tortilis</i> subsp. <i>heteracantha</i> (=Acacia tortilis subsp. <i>heteracantha</i>), <i>Boscia foetida</i> subsp. <i>rehmanniana</i> .
Tall Shrubs:	<i>Euclea undulata</i> (d), <i>Searsia engleri</i> (d), <i>Dichrostachys cinerea</i> , <i>Diospyros lycioides</i> subsp. <i>lycioides</i> , <i>Grewia flava</i> , <i>Tarchonanthus camphoratus</i> .
Low Shrubs:	<i>Vachellia tenuispina</i> (=Acacia tenuispina) (d), <i>Ptychlobium plicatum</i> .
Succulent Shrub:	<i>Kleinia longiflora</i> .
Herbaceous Climbers:	<i>Momordica balsamina</i> , <i>Rhynchosia minima</i> .



Dominant taxa	Species list
Graminoids:	<i>Aristida bipartite</i> (d), <i>Dichanthium annulatum</i> var. <i>papillosum</i> (d), <i>Ischaemum afrum</i> (d), <i>Setaria incrassate</i> (d), <i>Aristida canescens</i> , <i>Brachiaria eruciformis</i> .
Herbs:	<i>Aspilia mosambicensis</i> , <i>Indigastrum parviflorum</i> , <i>Nidorella hottentotica</i> , <i>Orthosiphon suffrutescens</i> , <i>Senecio apiifolius</i> .

6.8.1.3 Floral Species of Conservation Concern Assessment

The expected flora of conservation concern is listed according to the National Red List categories, included in the table below are the threatened species category: **Critically Rare**, **Rare**, **Declining**, **Data Deficient – Insufficient Information (DDD)**, **Near Threatened (NT)**, **Vulnerable (VU)**, **Endangered (EN)**, **Critically Endangered (CR)**, **Critically Endangered, Possibly Extinct (CR PE)**, **Regionally Extinct (RE)**, **Extinct in the Wild (EW)**. The categories of IUCN status and description of the floral species data was collected from the National Red List (Threatened Species Programme | SANBI Red List of South African Plants, 2021). For the project site, and surrounding region, there are no recorded SCC noted.

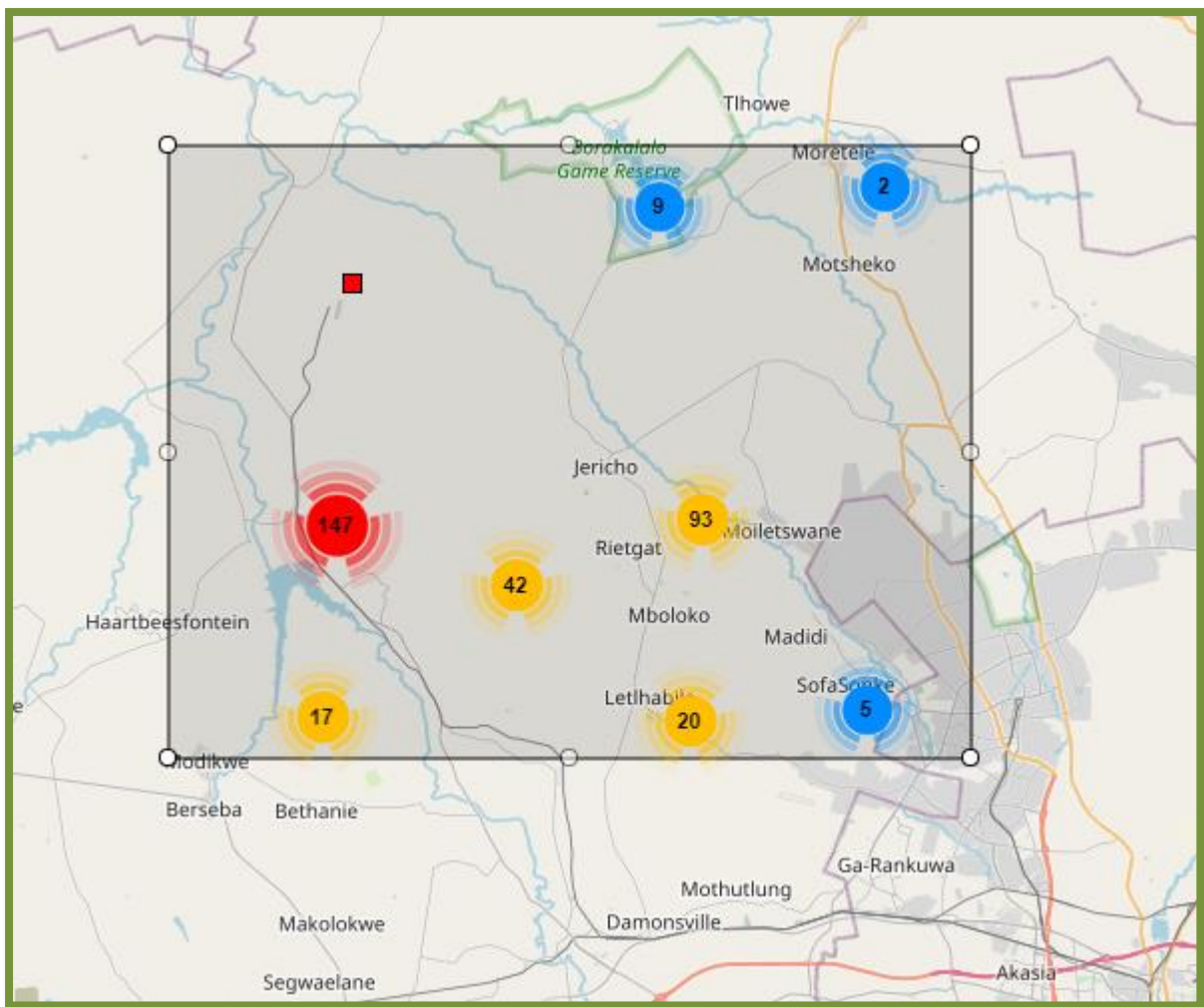


Figure 24: Map of the grid square drawn to indicate the expected floral species to occur within the project site and its surrounding region (BODATSA-POSA, 2016)



6.8.1.4 Field Survey results

The vegetation assessment field survey was conducted through the proposed development foot of the project area, where a walk-through was conducted, and the plant species were noted. The plant species which are listed below, include those which are of conservation concern. The rest of the plant species records are available upon request.

The dominant vegetation cover drastically divides the project area into two main habitat conditions, the mapped Degraded and Transformed vegetation habitat condition areas. The species *Vachellia tortilis* dominated the mapped Degraded area, and *Themeda triandra* in the Transformed area. *Vachellia tortilis*'s vegetation coverage is approximately 80% of the mapped Degraded area, and *Themeda triandra* dominated the Transformed area, covering an approximate area of 90%. However, the Degraded area is almost entirely overgrazed, and is in a poor habitat condition.

Table 28: Vegetation found on site

Family	Common Name	Species Name	Ecology	IUCN	CATEGORY / AREA: Invasive Species Class:
ASPHODELACEAE	Common soap aloe, Bontaalwyn	<i>Aloe maculata</i> susp. <i>maculata</i>	Not endemic to South Africa	LC	N/A
POACEAE	Red grass, rooigras, iNsinde	<i>Themeda triandra</i>	Not endemic to South Africa	LC	N/A
POACEAE	Couch grass, Bermuda grass, Quick grass, Kweekgras, Gewone kweek, Omgwena, Mohlwa, uQaqqa, uQethu	<i>Cynodon dactylon</i>	Not endemic to South Africa	LC	N/A
APOCYNACEAE	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	N/A
VERBENACEAE	Small Lantana	<i>Lantana rugosa</i>	Not endemic to South Africa	LC	N/A
FABACEAE	Black thorn, swarthaak, blouhaak, hakiesdoring, monga, mongangatau, munembedzi, monkana	<i>Acacia mellifera</i> (<i>Senegalia mellifera</i>)	Not endemic to South Africa	LC	N/A
ASPARAGACEAE	Zigzag Asparagus	<i>Asparagus retrofractus</i>	Not endemic to South Africa	LC	N/A
ASTERACEAE	<i>Data Deficient</i>	<i>Nidorella</i> sp.	<i>Data Deficient</i>	<i>Data Deficient</i>	N/A
POACEAE	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	N/A
POACEAE	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	<i>Data Deficient</i>	N/A
CACTACEAE	Prickly Pear	<i>Opuntia ficus-indica</i>	Naturalized exotics not assessed for National Red List	NE	1b Spineless cactus pear cultivars and selections are not listed. The fruit of the sweet prickly pear is not listed if used for human consumption.



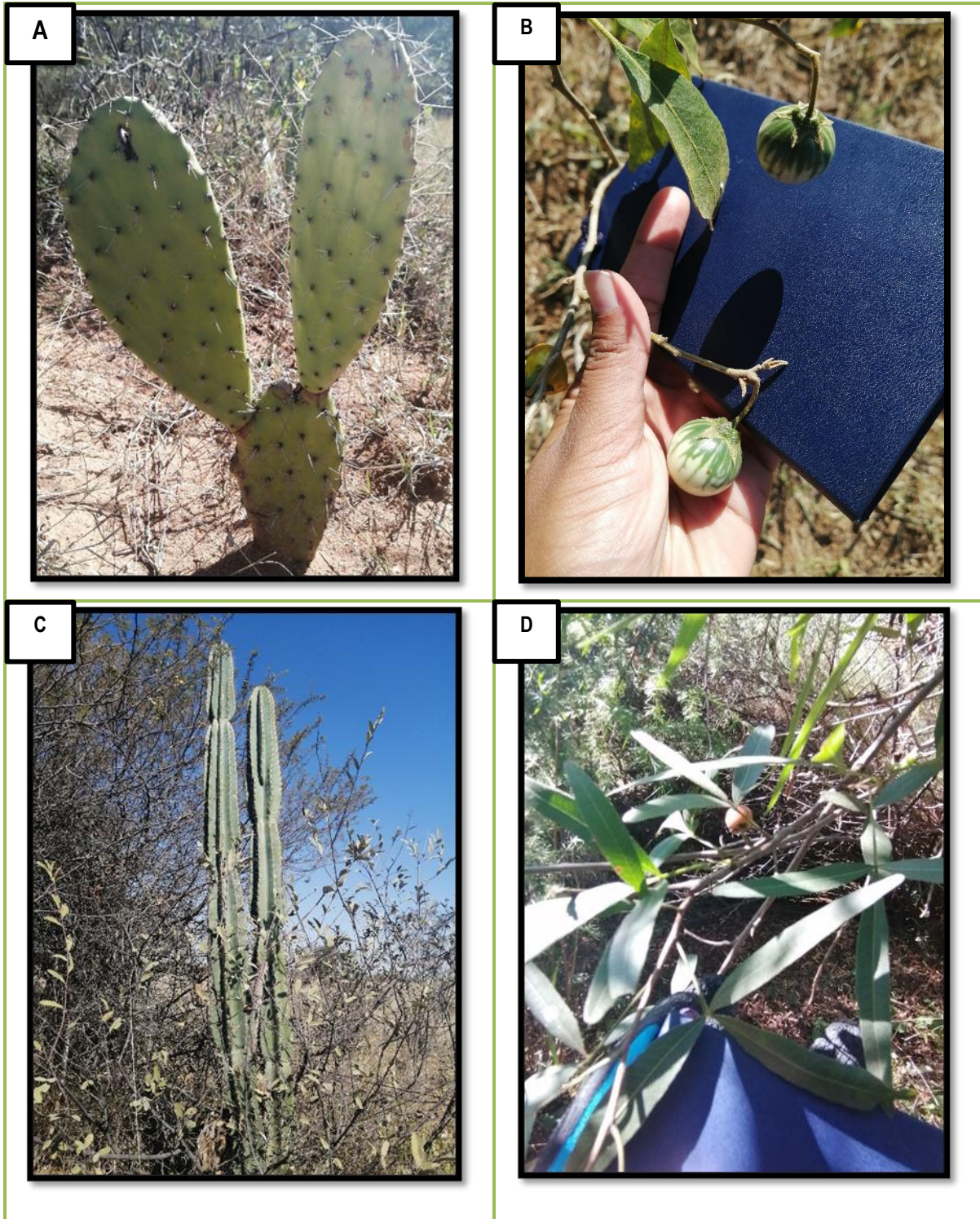
Family	Common Name	Species Name	Ecology	IUCN	CATEGORY / AREA: Invasive Species Class:
SOLANACEAE	Poison apple, Apple of Sodom, Bitter Apple, Bitterappel, Bitterappeltjie, Geelappel, Gifappel, Gifappeltjie, Intuma, Intuma-omncane, Intumemncane, Moralane, Morolwana, Poison Apple, Setlwane, Tholana	<i>Solanum campylacanthum</i> subsp. <i>panduriforme</i>	Not endemic to South Africa	LC	N/A
ASTERACEAE	Amalenjane, Beggar Ticks, Beggarsticks, Beggarticks, Black Fellows, Black-jack, Blanket-stabbers, Bur Marigold, Cobbler's Pegs, Common Black Jack, Duiwelskerwel, Gewone Knapsekerel, Isikhathula, Kaapsekerel, Kaapsekêrel, Knapsakkerel, Knapsakkêrel, Knapsakkerwel, Knapsekêrel, Knapsekerwel, Mokolonyane, Muchize, Mushiji, Ouwewenaar, Sweethearts, Tantgesiesebloemmetjie, Ucucuza, Ugamfe, Umesisi, Umhlabangubo, Uqadolo, Wedevrouens, Weduvrouens, Wewenaars, Widowers	<i>Bidens pilosa</i>	Not endemic to South Africa	LC	N/A
FABACEAE	Basterkameeldoring, Curly-pod Acacia, Fynhaak, Fynhaakdoring, Fyn-haakdoring, Haakdoring, Haaken-steek, Isishoba, Isithwethwe, Krulpeulakasia, Mosu, Mosu, Mosunyana,	<i>Vachellia tortilis</i>	Not endemic to South Africa	LC	N/A



Family	Common Name	Species Name	Ecology	IUCN	CATEGORY / AREA: Invasive Species Class:
	Moswana, Muswu, Muungakhanga, Nobos, Noobos, Nsasane, Sambreeldoring, Singa, Tafelboom, Umbrella Thorn, Umsasane, Withaakdoring, Wit-haakdoring, Withaakkameeldoring				
CACTACEAE	Nagblom, Queen of The Night	<i>Cereus jamacaru</i>	Naturalized exotics	NE	1b
ANACARDIACEAE	Karee	<i>Searsia lancea</i>	Not endemic to South Africa	LC	N/A
ULMACEAE	Basterwitpeer, Baster-witpeer, Basterwitpeerhout, Doringolm, Mulanguluvhe, Muthavhalunzhi, Thorny Elm, Umbhangbangwe, Umkaboti, Umkhovothi	<i>Chaetacme aristata</i>	Not endemic to South Africa	LC	N/A
CYPERACEAE		<i>Cyperus eragrostis</i>	Naturalized exotics	NE	N/A
APOCYNACEAE	African Heartvine, Donkieperske, Hondepisbossie, Opklim, Opklimbossie, Umulugwe, Wildekomkommer	<i>Pentarrhinum inspidum</i>	Not endemic to South Africa	LC	N/A

Table 29: Plant species found on site; A- *Opuntia ficus-indica*, B - *Solanum campylacanthum. subsp. panduriforme*, C- *Cereus jamacaru*, D - *Searsia lancea*





6.9 Fauna

6.9.1 Avifauna

With the use of the South African Bird Atlas Project, Version 2 (SABAP2) database and the identification of the specific pentads being used to identify avifauna species expected to be found in and around the project area, 316 bird species were noted.

Based on the bird species expected to be found within and around the project area, 14 bird species are noted to be listed as SCC, which can be seen in **Table 30** below with a species description.



Table 30: Expected bird species of conservation concern (SAPAP2, Pentads: 2515_2745, 2515_2750, 2515_2740, 2510_2745, 2520_2745)

Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
Tawny Eagle	<i>Aquila rapax</i>	VU	EN	Possible	The Tawny Eagle is widespread throughout sub-Saharan Africa. In southern Africa, it is largely concentrated in protected areas in the north-east and central parts of the region, which is confirmed by more recent SABAP2 data.
Curlew Sandpiper	<i>Calidris ferruginea</i>	NT	LC	Possible	This species is listed as Near Threatened owing to a global population decline which is thought to approach the threshold for Vulnerable under the population size reduction criterion. The species has an extremely large range and the overall population trend is very difficult to determine due to varying trends in different populations along different flyways.
Abdim's Stork	<i>Ciconia abdimii</i>	LC	NT	Likely	The species is an intra-African migrant, breeding in a wide band south of the Sahara from Senegal in the west to Ethiopia and Somalia in the east. From May to August, the eastern population migrates to southern Africa, with arrival often coinciding with the onset of summer rains in November-December. Within the region the Abdim's Stork has been described as locally common to abundant in North West, Limpopo, Free State and Mpumalanga provinces, with localised movements in response to environmental cues such as food availability.
Black Stork	<i>Ciconia nigra</i>	LC	VU	Possible	The Black Stork breeds widely across the Palearctic region and is a partial migrant into sub-Saharan Africa, remaining largely north of the equator. Within the region, it occurs predominantly in the southern and eastern provinces, avoiding the drier interior and west
European Roller	<i>Coracias garrulus</i>	LC	NT	Possible	Within the region, the species is concentrated in the upper-middle Limpopo River drainage, the Lowveld region of Mpumalanga and Limpopo, and coastal KwaZulu-Natal. In Africa, a wide range of dry, open land with trees is used and it winters primarily in dry, wooded savanna and bushy plains, where it typically nests in tree holes.
Lanner Falcon	<i>Falco biarmicus</i>	LC	VU	Possible	Within the region, the species occurs widely but sparsely throughout South Africa, Lesotho and Swaziland, with the highest densities recorded in Western Cape and KwaZulu-Natal. The species has been able to take advantage of existing corvid nests on transmission poles in the Karoo, enabling it to inhabit large expanses of otherwise treeless habitat.



Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
White-backed Vulture	<i>Gyps africanus</i>	CR	CR	Likely	Within the region it occurs in the northern parts of South Africa and in eastern Swaziland. In South Africa, it is only absent from two of the nine provinces, i.e. Western Cape and Eastern Cape provinces, and from Lesotho.
Cape Vulture	<i>Gyps coprotheres</i>	EN	EN	Likely	The regional population is divided into three primary 'nodes', one each in the north-east (Limpopo, Mpumalanga, North West and Gauteng provinces), south-east (mainly in Lesotho and the KwaZulu-Natal and Eastern Cape provinces, extending marginally into adjacent parts of Free State Province and Swaziland) and south-west (Western Cape Province) of the region.
Marabou Stork	<i>Leptoptilos crumenifer</i>	LC	NT	Unlikely	The Marabou Stork occurs throughout sub-Saharan Africa. Within the region, it is primarily a non-breeding visitor from farther north in Africa, with only scattered and sporadic breeding records known from the Kruger National Park and one established breeding site in Hlane Royal National Park in eastern Swaziland.
Yellow-billed Stork	<i>Mycteria ibis</i>	LC	EN	Possible	It is widespread within the region but avoids arid western areas and has been described as a facultatively nomadic species. Some individuals are always present and presumably resident, but the regional population is supplemented by migrants from the north, especially during summer; some immigrants, most of which are probably from the southern Africa, may breed in South Africa.
Lesser Flamingo	<i>Phoeniconaias minor</i>	NT	NT	Unlikely	The Lesser Flamingo's non-breeding distribution in South Africa is centred on the central Highveld, but it also occurs along the West and South coasts. Large numbers have been recorded at Lake St Lucia, KwaZulu-Natal (IBA SA058), Berg River (IBA SA104), Wadrif Saltpan and Langebaan Lagoon (IBA SA105) in Western Cape, and Kamfers Dam, Northern Cape.
Greater Painted-snipe	<i>Rostratula benghalensis</i>	LC	NT	Possible	In the region, the species is spatially and temporally erratic in occurrence, with its presence and abundance largely determined by rainfall. Its movements are poorly understood and apparently complex and unpredictable. It occurs at scattered wetland localities across much of the north-eastern half of the country, as well as sparsely in coastal areas in Eastern Cape, mainly in summer.
Secretary bird	<i>Sagittarius serpentarius</i>	EN	VU	Possible	In South Africa the species has a broad distribution having been reported in 1 262 or 64.9% of South Africa's Quarter Degree Squares (QDSs). In



Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
					Swaziland, the species is only regularly encountered in Malolotja National Park and neighbouring areas in the north-east of the country.
Lappet-faced Vulture	Torgos tracheliotos	EN	EN	Possible	The Lappet-faced Vulture occurs in the northern regions of South Africa and in eastern Swaziland (Mundy 1997). The current range is much reduced from earlier times, and it has disappeared as a breeding species from Western Cape, Eastern Cape and Northern Cape south of the Orange River.

6.9.2 Mammals

With the use of the MammalMap database provided by the Animal Demography Unit (FitzPatrick Institute of African Ornithology), 30 mammal species were noted.

Based on the mammal species expected to be found within and around the project area, 8 mammal species are noted to be listed as a conservation concern, which can be seen in **Table 31** below.

Table 31: Expected mammal species of conservation concern (ADU, QDS: 2527BD, 2527BB, 2527BA, 2527BC, 2528AA, 2528AC)

Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
Leopard	<i>Panthera pardus</i>	VU	VU	Unlikely	The Leopard has a wide habitat tolerance, including woodland, grassland savannah and mountain habitats but also occur widely in coastal scrub, shrubland and semidesert (Hunter et al., 2013)
Brown Hyena	<i>Hyaena brunnea</i>	NT	NT	Unlikely	Brown hyenas prefer to den in arid to semi-arid grassland and savanna biomes at no higher than 1500 m in elevation but are also found in desert regions that receive less than 100 mm of rain annually. By consuming fruit with a high water content as an alternative to fresh water sources they are able to survive in drier regions.
Plains Zebra	<i>Equus quagga</i>	NT	LC	Unlikely	The plains zebra (<i>Equus quagga</i> , formerly <i>Equus burchellii</i>), also known as the common zebra, is the most common and geographically widespread species of zebra. Its range is fragmented, but spans much of southern and eastern Africa south of the Sahara (King & Moehlman, 2016)
Mountain Reedbuck	<i>Redunca fulvorufula</i>	EN	EN	Unlikely	The mountain reedbuck (<i>Redunca fulvorufula</i>) is an antelope found in mountainous areas of much of sub-Saharan Africa and are predominantly grazers, with water being an important habitat requirement



Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
Cape Clawless Otter	<i>Aonyx capensis</i>	NT	NT	Possible	<i>Aonyx capensis</i> is the most widely distributed otter species in Africa. Their home range is limited to the African continent, stretching along the coast from South Africa to Ethiopia and across the continent to Senegal. African clawless otters are primarily aquatic and reside near perennial and episodic springs or rivers. Marine populations do occur if a source of freshwater is nearby for drinking.
Bontebok	<i>Damaliscus pygargus</i>	VU	VU	Unlikely	Bontebok (<i>D. p. pygargus</i>) are found in the highveld and coastal plains of South Africa and populations are more or less confined to protected areas in South Africa.
Sable Antelope	<i>Hippotragus niger</i>	LC	VU	Unlikely	Within the assessment region, Sable Antelope naturally occur in the Lowveld of eastern Mpumalanga, northern Limpopo, and west into the North West Province. They have been reintroduced patchily into many areas of their former range. However, they have also been widely introduced to both formally protected and private areas outside the historical range, such that there are extra-limital subpopulations in the Northern Cape, Western Cape, Eastern Cape, Free State, and KwaZulu-Natal provinces.
Tiang	<i>Damaliscus lunatus</i>	LC	VU	Unlikely	Within the assessment region, its natural distribution extends to western and eastern Limpopo, northwestern and eastern Mpumalanga, northern and western North West Province, eastern Northern Cape, western Free State and the extreme north of KwaZulu-Natal. It has been widely reintroduced across this range, especially on private land. Additionally, it has been widely introduced into areas of KwaZulu-Natal, Free State, Mpumalanga and Northern Cape provinces.

6.9.3 Herpetofauna (Reptiles and Amphibians)

With the use of the ReptileMap and FrogMap database provided by the Animal Demography Unit (FitzPatrick Institute of African Ornithology), 31 reptile species and 11 frog species were noted.

The expected Amphibians species list to occur within the project site was assessed, using the Quarter Degree Square scale on the mapped species list (FitzPatrick Institute of African Ornithology: University of Cape Town, 2003). The IUCN red list status was also provided, per unique species occurrence per QDS, where the conservation status was determined from the global IUCN red list (IUCN, 2021).



Based on the herpetofauna species expected to be found within and around the project area, no amphibian species are noted to be listed as a conservation concern, however 1 reptile species is noted to be of conservation concern.

Table 32: Expected reptile species for conservation concern (ADU – ReptileMap, QDS: 2527BD, 2527BB, 2527BA, 2527BC, 2528AA, 2528AC)


Common Name	Species Name	IUCN (Red List) - 2017	SANBI (Red List)	Likelihood of Occurrence	Description
Lobatse Hinged Tortoise	<i>Kinixys lobatsiana</i>	VU	VU	Possible	Kinixys lobatsiana is a savanna species that inhabits rocky hillsides in habitats of mixed Acacia and Combretum woodland, tropical Bushveld and Thornveld where vegetation ranges from dense, short shrubland to open tree savanna. Kinixys lobatsiana is near-endemic to South Africa, extending from the northeastern parts of the North West Province, eastwards through northern Gauteng and adjacent parts of Mpumalanga and northwards into Limpopo, south of the Soutpansberg.

6.9.4 Field Survey findings

6.9.4.1 Avifauna

Based on the expected species list with Desktop Results, 124 bird species were noted. One avifaunal species was recorded during the field survey, from a visual sighting of the animal, as well as feather samples picked from the ground (iNaturalist, 2021).

Table 33: Avifauna species identified



Common Name	Species Name	IUCN (Red List)	SANBI (Red List)	Field survey image
Helmeted Guineafowl	<i>Numida meleagris</i>	LC	LC	 <p>Figure 25: Helmeted Guineafowl, <i>Numida meleagris</i>, feather sample collected during the field survey.</p>
Spotted Thick-knee	<i>Burhinus capensis</i>	LC	LC	Visual Sighting



6.9.4.2 Mammals

The mammal species recorded during the field survey were identified through track impressions on the soil, fecal samples found within the project area, and a visual sighting of the animal (Banded Mongoose). A field guide book was used to identify the fecal samples and the animal track images, which were captured during the field survey (Stuart & Stuart, 2019)

Table 34: Mammal species identified

Common Name	Species Name	IUCN (Red List)	SANBI (Red List)	Field survey image
Banded Mongoose	<i>Mungos mungo</i>	LC	LC	
Scrub hare	<i>Lepus saxatilis</i>	LC	LC	

6.9.4.3 Herpetofauna

Based on the expected species list with Desktop Results, 22 reptile species and 15 frog species were noted. However, there were no herpetofauna species recorded during the field survey, either through track impressions on the soil, faecal samples or a visual sighting of the animal.

6.10 Land Use and Land Cover

6.10.1 Land use

The current land use of the study area is noted to be zoned as Agricultural. This is in line with the proposed development as aquaponics is recognised as agriculture. In addition, the proposed piggery and chicken operation is within the agricultural sector.

6.11 Heritage

A Heritage Impact Assessments (HIA) was compiled Tsimba Archaeological Footprints (Pty) Ltd and is attached as **Appendix G1**.



6.11.1 Archaeological and Historical Background

The arrival of early farming communities during the first millennium, heralded in the start of the Iron Age for South Africa. The Iron Age is that period in South Africa's archaeological history associated with pre-colonial farming communities who practiced cultivation and pastoralist farming activities, metal working, cultural customs such as lobola and whose settlement layouts show the tangible representation of the significance of cattle.

The tangible remains of the Iron Age are frequently identified in the general surroundings of the study area, and these may include potshers, stonewalled settlements, grinding stones and metal smelting and forging sites. During the period between AD 1650 and AD 1900 the area north of the Magaliesberg Mountains, from Rustenburg in the west to Onderstepoort in the east, was characterised by thousands of stonewalled settlements located along the bases of the granite outcrops of the area. These settlements represented the spheres of influence of various Sotho-Tswana chiefdoms, including the Ba-Kgatla, Po, Ba-Kwena and Phokengokeng.

An assessment of the different histories of these groups suggest that it was especially the Bakwena ba Mogôpa and Bapo ba Mogale who were associated with the surroundings of the study area. The origins of the Bakwena ba Mogôpa can be traced back to a place named Rathatheng, near the junction of the Marico and Crocodile (Odi or Oori) Rivers, where the Bakwena ba Mogôpa were known to have settled as early as AD 1600. During the mid-seventeenth century, the Bakwena ba Mogôpa moved from Rathatheng to Lokwadi (Zandrivierspoort) near the foot of the Phalane Mountains.

During the first half of the eighteenth century, the Bakwena ba Mogôpa moved to the Mabjanamatswane Hills, north-east of modern-day Brits. While these hills are located approximately 10km north of the present study area, the sphere of influence of the Bakwena ba Mogôpa during this time stretched from the Crocodile River in the west to the Apies River in the east, and from the Pienaars River in the north to the Hennops River in the south.



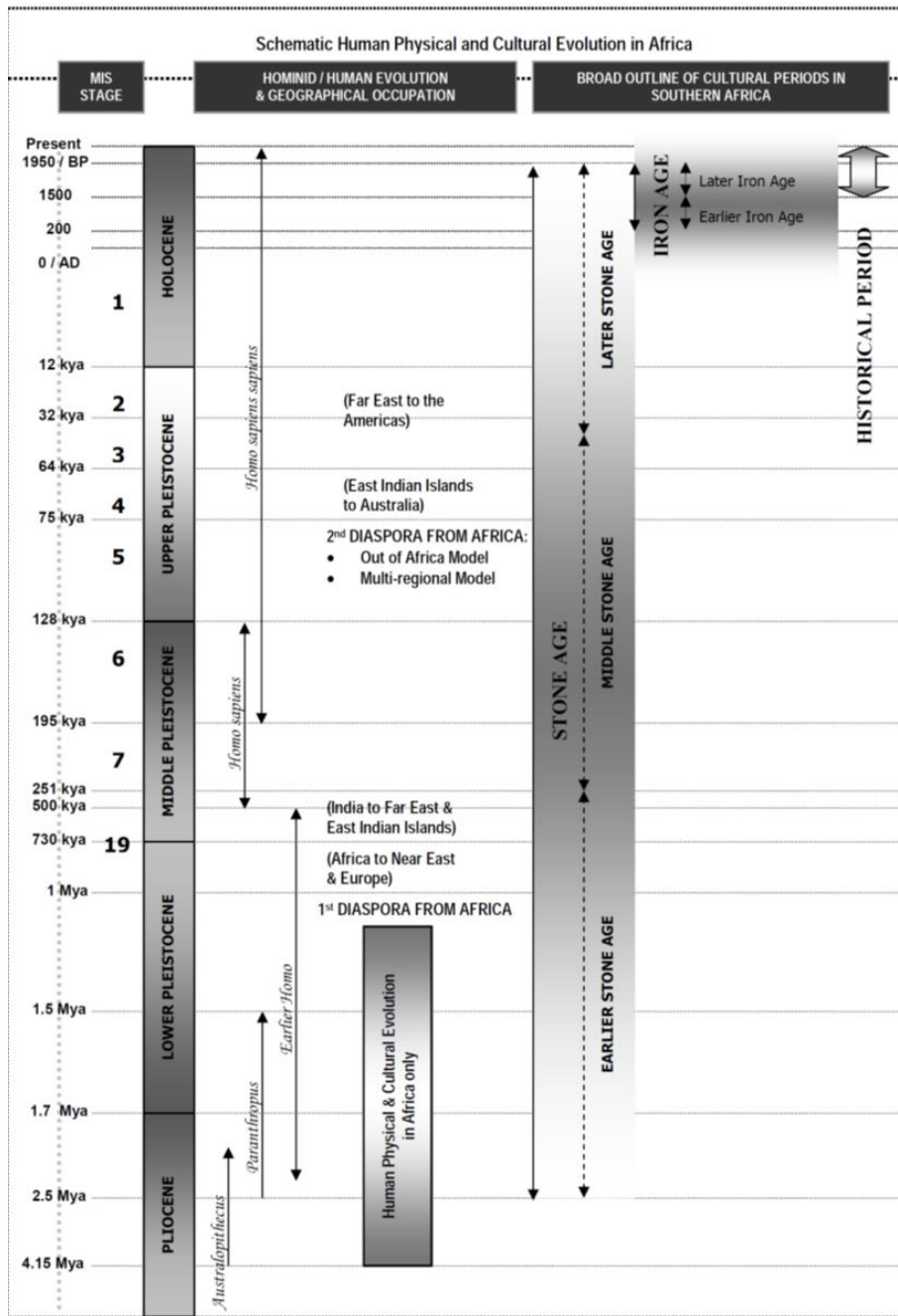


Figure 26: Human and Cultural Timeline in Africa

6.11.2 Heritage Historical Background

The Bakwena assumedly crossed the Botletli (Zambezi) River from central Africa. This was before the eleventh century when the Bakwena was still part of the larger single Sotho group. Later the Sotho group subdivided into a number of groups, namely the Bahurutshe, the Bakwena, the Bakgatla, Bakgalagadi, Bafokeng and the Barolong. The Bakwena group which remained in the area between the Marico and Crocodile rivers experienced problems. There was competition for resources, which led to a subdivision of the group. Two chiefdoms, the Bangwaketse and the Bangwato, broke away and settled in the present Botswana. 6 Another group broke away from the Bangwaketse. They migrated along the Marico River and settled at Rathateng, also known as Matlhare, on the lower reaches of the Crocodile River. The area consisted of different settlements, of which Bethanie and Makolokwe were the main ones. They were under chief Sethlare, the father of Mogopa. He renamed his tribe the Bakwena ba Mogopa and claimed that it was the original name of the tribe.

His claim might be based on the fact that the Bangwaketse were the offshoot of the Bakwena and the name Bakwena was restored to the tribe. The tribe was politically organised into dikgoro (clans). A kgoro was usually composed of families that



were in most cases closely related to their headman through descent in the male line from one common or assumed ancestor. These dikgoro formed the most important parts of the tribe as their dikgosana (headmen) formed the tribal council under the tribal chief. There was a distinction between the dikgoro of the nobility, i.e. those related to the chief, who had the kwena (crocodile) as their totem and the dikgoro of the commoners

The Bakwena ba Mogopa community, having worked as labourers on "Free State" farms, grouped together and bought their first piece of land, Zwartrand, in 1911, in the Ventersdorp region, and later acquired another farm, Hartebeeslaagte. This indigenous polity was organized along communal lines and headmen represented their family lines, or kgoros. There was not an overall chief in Mogopa, but rather a senior headman, as the paramount chief of the Bakwena people was in an area near Brits.

By the 1980s, there were two schools, a clinic, shops, a reservoir, and a thriving agricultural sector. Mogopa farmers sold crops to the local agricultural co-operative, besides catering for the community.

In the early 1980s the community had a problem with their new senior headman, Jacob More, and tried to lay a case of corruption against him and have him ousted from his position. The government was quick to take advantage of the situation, with the local magistrate responding to this request by stating that using the Native Authorities Act of 1927, he had the authority to keep Jacob More in power. Sensing an Achilles heel in the unity of this community, state officials started liaising with Jacob in the early 1980s about moving the community to an area called Pachsdraai, in Bophuthatswana, the demarcated homeland intended for all Tswana people. Now they capitalized on the situation that was prevalent in Mogopa at that time because of the conflict between the community and Jacob More. So they capitalized on this conflict that this is the right time to come in. So they went in and destroyed the community.



Figure 27: The farmhouse that was given to Jacob

Jacob was offered the farmhouse at Pachsdraai that used to belong to the white farmer that had owned the land before it had been expropriated by the state. As headman, he failed to consult the Mogopa community from which he was estranged over the corruption issue. In 1983, he moved to Pachsdraai with 10 other families.

6.11.3 Archaeology

During the site visit, vegetation density was noted to be moderate to high on the throughout the of the proposed development area. Some areas indicate high soil visibility whilst in other areas grass cover is very dense. It is however, highly unlikely that significant archaeological remains, or other heritage resources such as structures or ancestral graves, are present. The study area is currently being used as a grazing field making vegetation cover to be very low. Some of the areas within the site were also burnt to allow for easy cattle grazing. This meant that archaeological artefacts and sites identification was going to be very easy. None of these findings were however were found within the study area.

6.12 Socio-economic

The socio-economic aspect of the site has been determined utilising the Statistics SA 2011 for Ward 2 (63702002) under the Madibeng Local Municipality. In addition, the Feasibility study compiled by Urban-Econ Development Economists on behalf

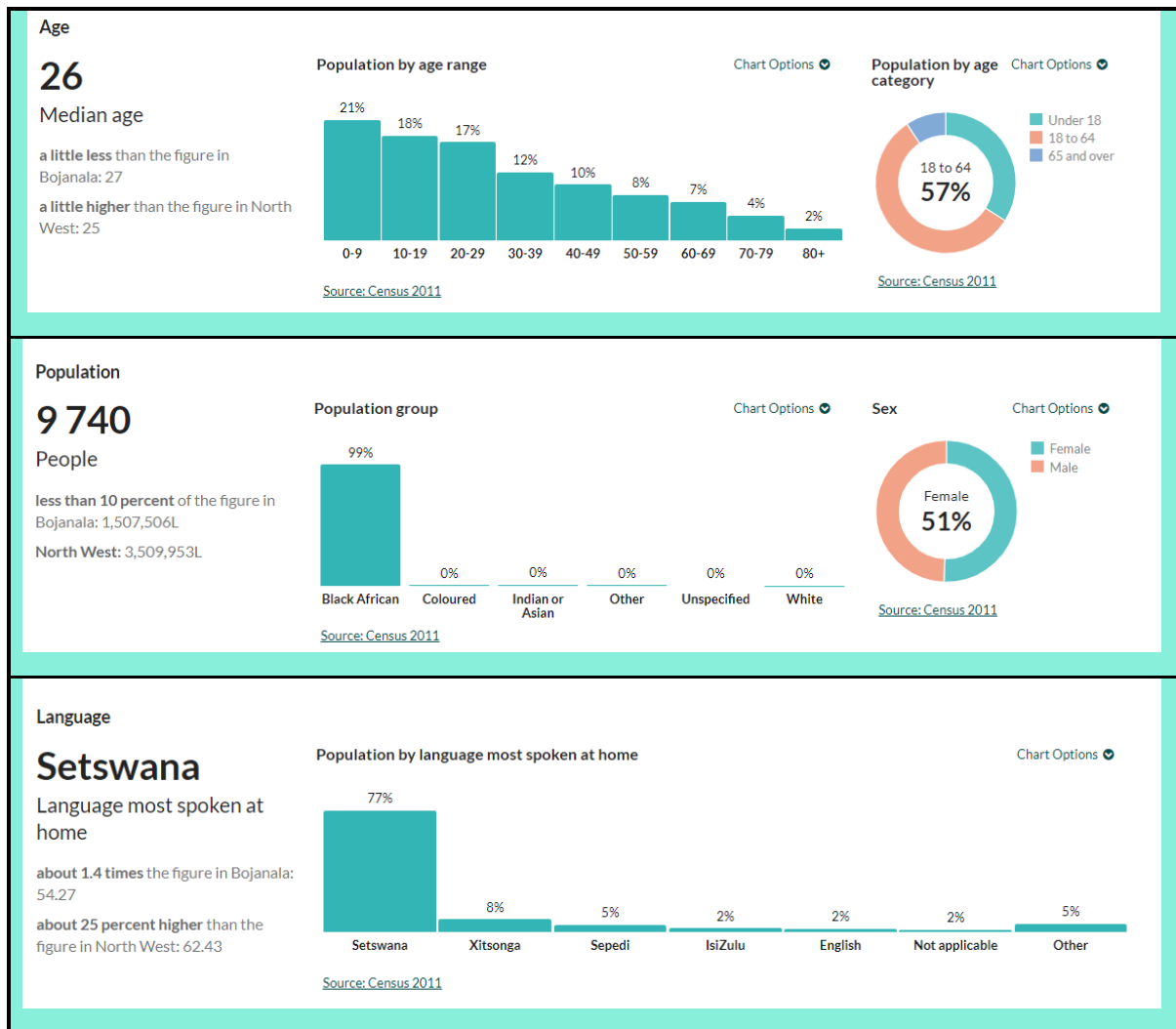


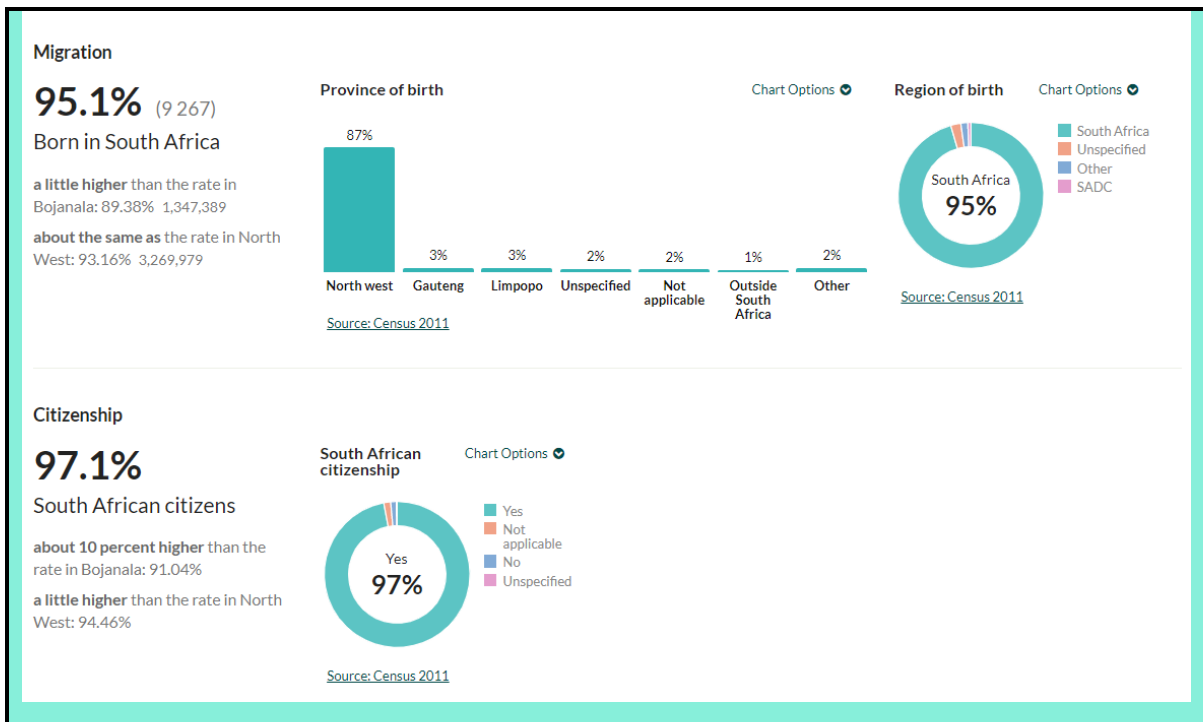
of Department Of Agriculture, Forestry & Fisheries dated 2018 has been utilised to evaluate the economic viability of the proposed development.

6.12.1 Demographics

According to the Statistics SA 2011 for Ward 2, the demographics of the ward indicate that approximately 9740 people live within the ward, with a median age of 26. Black Africans dominate the ward as compared to Whites at 0%. Setswana is noted as the dominant language followed by Xitsonga at 8%. At least 95.1% of the population is born in South Africa whilst 1% represents the population born outside of South Africa. The population of the ward is largely dominated by females at 51%.

Table 35: A summary of the demographics of Ward 2 (<https://wazimap.co.za/profiles/ward-63702002-madibeng-ward-2-63702002/>)





6.12.2 Levels of Education

Approximately 57.8% of the population completed Grade 9 or higher whilst only 34.1% completed Matric or higher (Figure 28).

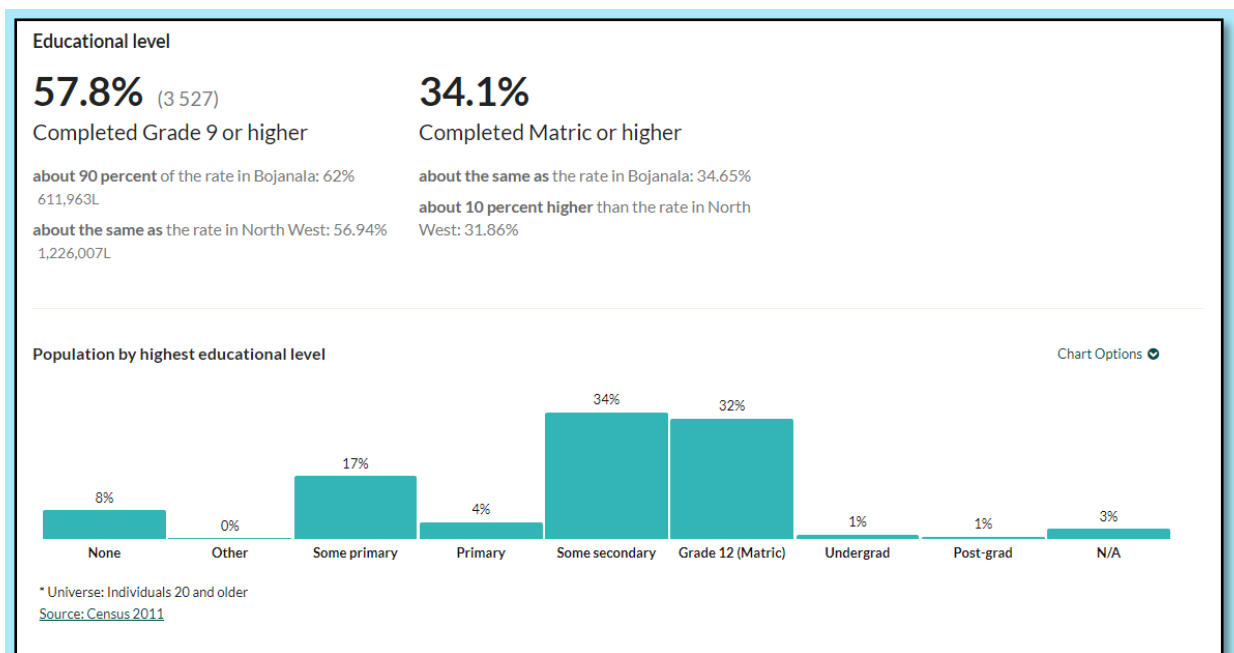


Figure 28: A summary of the education levels of Ward 2

6.12.3 Economic Activities and Employment levels

The Bojanala Platinum District Municipality IDP states that high unemployment rate is noted especially amongst the youth. The Stats SA indicates that only 26.9% of the population is employed mainly within the formal sector. The average annual income of each household about the same as that of the Bojanala Platinum District Municipality household income value at R30 000.00. A large number of the population earns between R20 000-R 40 000 per year.



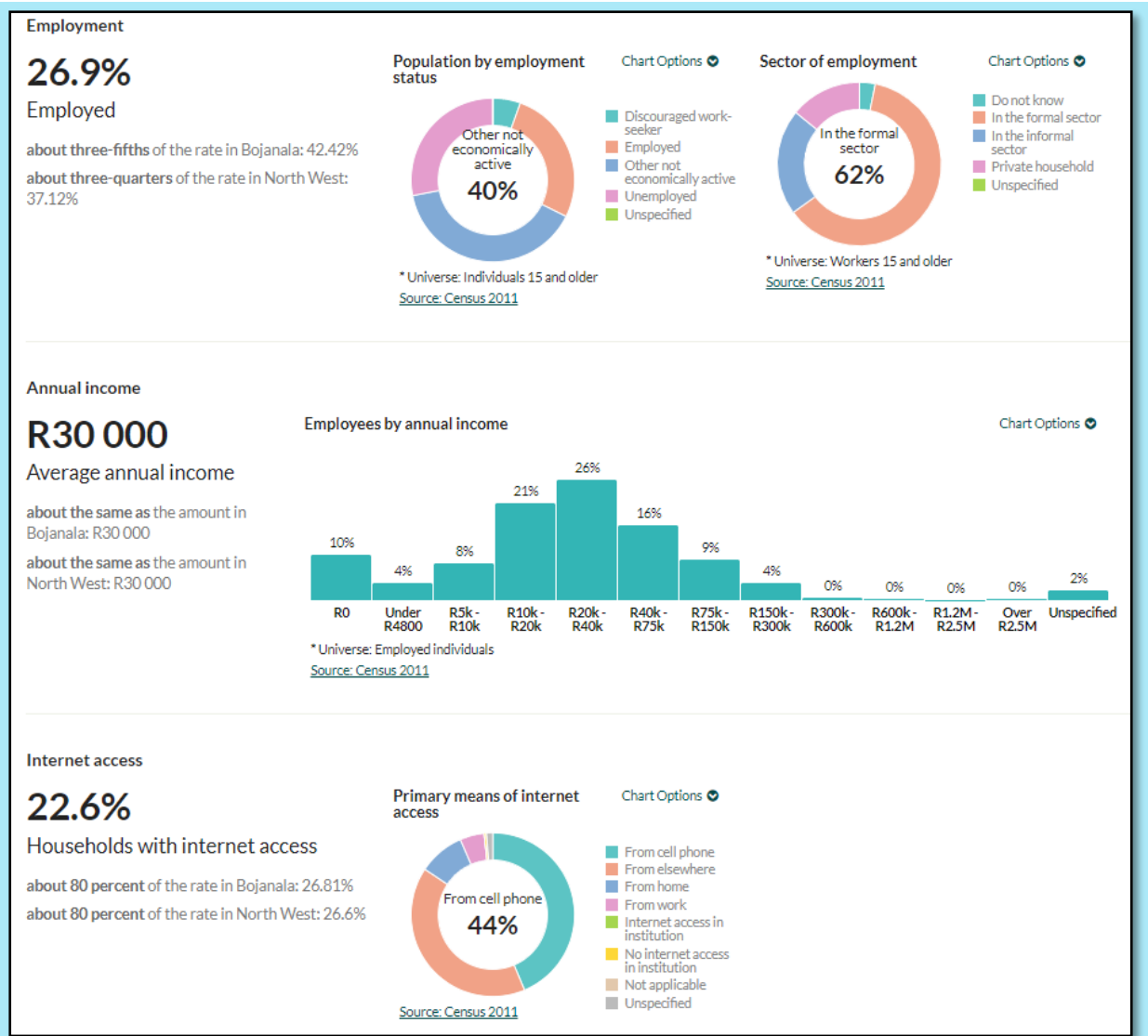


Figure 29: Summary of the economic profile of Ward 2

6.12.4 Economic Viability

The information below is informed by the Feasibility study compiled by Urban-Econ Development Economists on behalf of Department Of Agriculture, Forestry & Fisheries dated 2018 has been utilised to evaluate the economic viability of the proposed development.

6.12.4.1 Regional and Local Markets

Tilapia is by far the favourite fish in most part of Africa, and is being sold as various products including:

1. **Fresh whole fish** – this is the most popular form of product and is most common at the source of the supplier (farms or fisheries sites) which can range from small sizes (150 grams) to 450 grams (average plate size) to a larger size of about 650 grams.
2. **Fresh or frozen fillet** – not that common but increasing in popularity. Mostly found at the retail outlets and upper markets restaurants. Increasingly these products can be found at retail outlets and through large commercial farms.
3. **Frozen whole fish** – Very common and mostly supplied through the importation channels (such as China and India). Typically sold at an average plate size fish.



4. **Dried/Salted**- Common product mostly in rural areas and is being offered by local traders. Asia markets often import to Africa countries, however local demand exceeds imports.

Based on South African producer's experience, and ongoing research into the informal market for fish, it was found that if a rural area or township has high representation of African diaspora communities, tilapia can be sold for R 12 per fish, which equates to an estimated R 50.00/kg and more. However, in a township or area where the African diaspora is small and widely spread, these prices are not likely to be achieved. Prices may range from R35-38.00/kg for 300-gram fish.

6.12.4.2 Price Sensitivity

The generic economic models clearly identify the key impact pricing of the fish (Rands/kilogram) plays in determining the minimum and maximum profitable scales of production. The average farm gate price for the **Nile tilapia ranges from R 30 to R 40 per kilogram in South Africa**, however based on the generic economic model results, it is evident that at these prices, it would not be profitable for a start-up producer to produce Nile tilapia.

The size of the Nile tilapia being sold plays a major role in the profitability of an operation and the selling price that should be targeted.

The applicant aims to produce 100 tons per year. According to the feasibility study, based on the table below, a RAS system is profitable for Nile tilapia production **when producing 34 tons of fish per annum and selling at a price of R 74/kg**. A **positive PI of 1.02 was achieved**, with an IRR of 7%, indicating good investment potential exists. This is based on 2017/2018 figures.

Table 36: Financial Analysis: Nile tilapia in a Pond System

Production and Financial Assumptions	
Province	Limpopo
System	RAS
Species	Nile tilapia
Average Farm Gate Price	R 74/kg
Minimum Profitable Scale	34 tons
Selected selling weight	465 grams (8 months)
Target market	Local Market
Applicant details	Start-up farmer with existing land, no infrastructure, or facilities
Education level	Formal Education (certificate, diploma, degree)
Finance option	Debt/Equity (20%)
Interest Rate	8.25%
Generic Economic Model Results	
Total Capital Expenditure	R 9 689 071.24
Working Capital	R 1 925 265.82
Infrastructure expenditure	R 7 763 805.42
Profitability Index (PI)	1.02
Internal Rate of Return (IRR)	7%
Net Present Value (NPV) over 10 years	R 9 922 775

6.13 Land use and land cover

It has been noted that the current land use for study area is grazing for cows. A guest house is noted west of the site. Grassland dominates the land cover whilst scattered rural residences are noted in close proximity to the study area. The site images have been attached as **Appendix B**.



7 RESOURCE USE AND PROCESS DETAILS

This section provides resource details during construction and operation phase of the development. This includes services i.e. electricity, water, sewer and waste.

7.1 Waste, effluent, and emission management

7.1.1 Solid waste management

Solid waste is anticipated to be produced during construction and operational phase of the proposed development. It has been noted that Jericho does not get waste collection from the municipality therefore domestic and construction waste will be disposed off at Letlhabile landfill site as it is the nearest location where refuse removal is provided for by the municipality

Organic waste as a result of packaging of vegetables will be fed to the snails, and any uneaten rotten will be composted (concrete prepared area) and used for crops.

Fish waste will be put into a mineralisation tank to extract minerals, and then transferred to a digester to extract methane for heating of houses.

Piggery waste will be sent into a digester to extract methane, and then the remains will be liquid compost to be used for crops.

Poultry waste will be sent into the digester to extract methane, and the remains will be liquid compost to be used for crops.

7.1.2 Liquid effluent (other than domestic sewage)

No liquid effluent is anticipated for the proposed development.

7.1.3 Liquid effluent (domestic sewage)

The proposed development aims to utilise eco-friendly waste management processes. Liquid effluent from restrooms will be transferred into a digester to extract methane, and the remains will be liquid compost to be used for crops.

7.1.4 Emissions into the atmosphere

The RAS system to be utilised for the proposed aquaponics project is a closed system. It is therefore not anticipated that significant emissions into the atmosphere will be released to trigger the need for a licence. In addition, the rural nature of the study area suggests that air emissions are livestock (manure), vehicles and dust from the dirt roads. It is worth noting that the current state of the ambient air quality is good.

7.2 Water Use

The applicant aims to utilise groundwater as a water resource. A licence has been obtained from the Department of Water and Sanitation to abstract 370m³ per annum of groundwater under Section 21 (a) of the National Water Act, Act 36 of 1998.

7.3 Power Supply

There is an existing Eskom powerline that passes through the farm. It is anticipated that heating will initially be through electricity (with a backup diesel generator) as the digester takes a month before it is ready, and the waste will still be generated as the Tilapia will still be small.

7.4 Energy Efficiency

The applicant proposes to utilise a bio-digester to convert waste into thermal energy. A generator has been provisioned as an alternative source of energy.



8 PUBLIC PARTICIPATION PROCESS

This section of the report describes the public participation process conducted to date in accordance with the requirement of the EIA Regulations, 2014. Applicable documentation has been attached as **Appendix E**.

8.1 Phase 1 Public Participation

8.1.1 Invitation

The invitation was sent to the identified interested and affected parties on the 15th April 2021 for a period of 30 days. The Background Information Document was attached to the invitation.

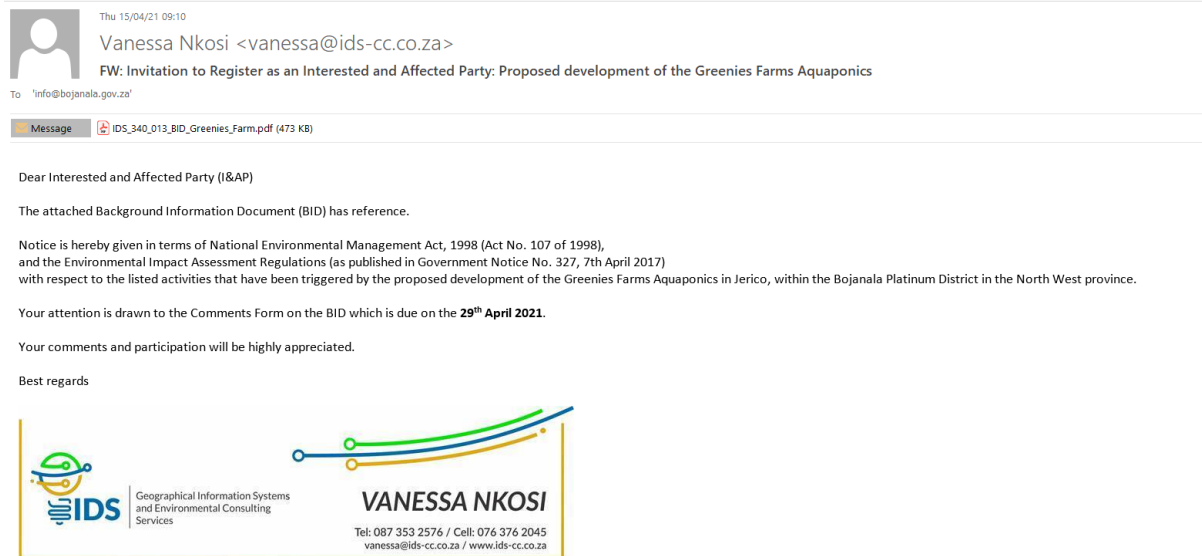


Figure 30: Proof of site notification

8.1.2 Site Notification

Four (4) A3 site notices were placed in pre-selected locations in discussion with the applicant. The location of the site notices is indicated by Figure x below. Proof of the site notices has been attached as **Appendix E1**.



Table 37: Description of site notices

Site Notice Number	Description	Geographic coordinates
SN1	 <p data-bbox="628 1005 1019 1037">Placed at the entrance of the study area</p>	<p data-bbox="1235 647 1382 678">25°18'34.30"S</p> <p data-bbox="1235 701 1382 732">27°47'59.40"E</p>
SN2	 <p data-bbox="480 1456 1171 1518">Placed at the end of the official gravel access road, an area noted as a meeting points for informal footpaths.</p>	<p data-bbox="1235 1249 1382 1281">25°18'48.86"S</p> <p data-bbox="1235 1303 1382 1335">27°47'54.44"E</p>



Site Notice Number	Description	Geographic coordinates
SN3	 <p data-bbox="504 987 1145 1021">Placed at a local bus stop in close proximity to an area of interest.</p>	<p data-bbox="1241 611 1374 645">25°19'5.46"S</p> <p data-bbox="1241 665 1382 698">27°47'40.13"E</p>
SN4	 <p data-bbox="445 1760 995 1794">Placed outside the tribal authority offices and post office.</p>	<p data-bbox="1238 1379 1382 1413">25°19'40.13"S</p> <p data-bbox="1238 1433 1382 1467">27°48'15.11"E</p>



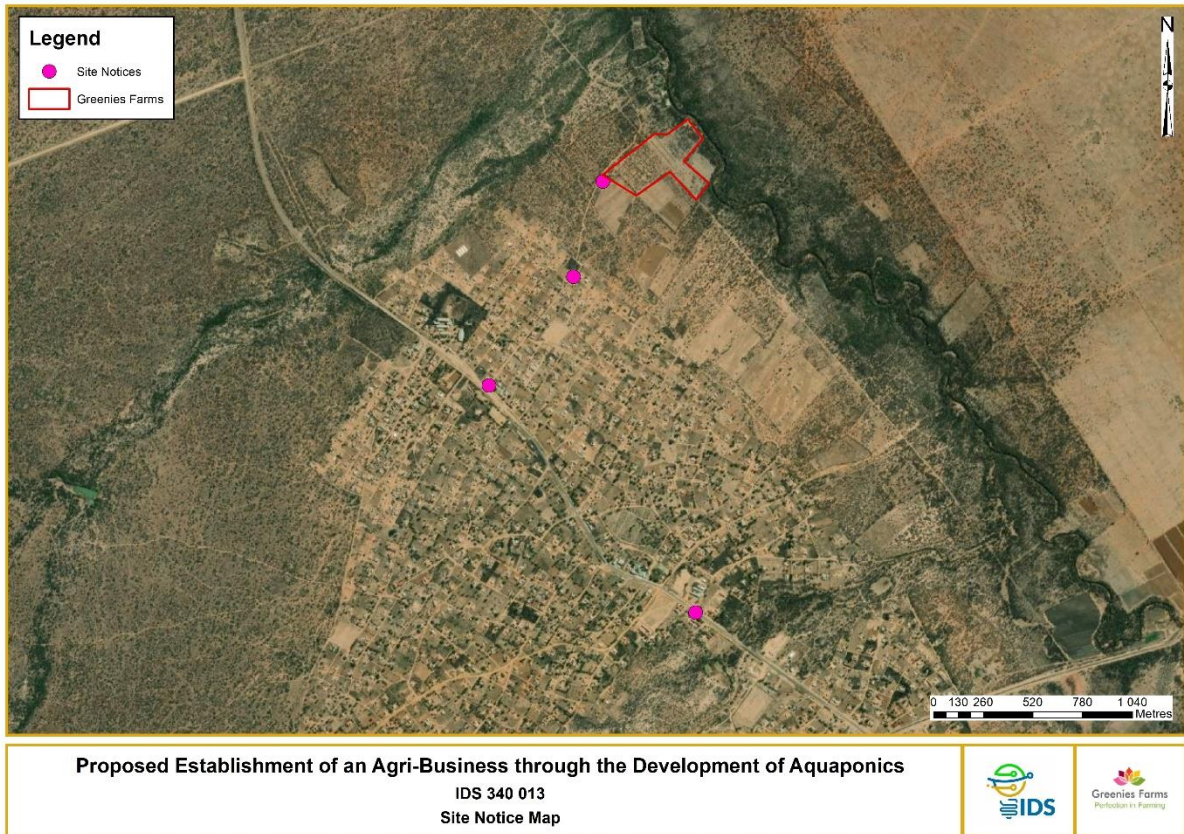


Figure 31: Proof of site notices

8.1.3 Background Information Document

A Background Information Document was distributed on site and electronically to the public and stakeholders dated April 2021. The purpose of the BID is to provide members of the public with information about the proposed project. This information allowed readers to:

- Determine whether they are an Interested and Affected Party (I&AP).
- Understand the project in order to provide informed comments.
- Understand the applicable environmental authorisation process in order to participate meaningfully.

A registration form was attached to the BID for commenting purposes.





Figure 32: An abstract of the BID

8.1.4 Database

An interested and affected parties database has been compiled (**Appendix E9**) and the following stakeholders have been invited;

- National Department of Water and Sanitation
- South African Heritage Resources Agency (SAHRA)
- North West Province (Agriculture, rural development, land and environmental affairs)
- Madibeng Local Municipality (Refuse & Waste)
- Bojanala Platinum District Municipality
- Ward 2 councillor
- Eskom
- North West Parks Board
- Birdlife South Africa
- WESSA



 PROPOSED DEVELOPMENT OF THE GREENIES FARMS AQUAPONICS IDS REFERENCE NUMBER: IDS 340_013 IAP DATABASE 			
ORGANISATION	CONTACT PERSON	CONTACT NUMBER	EMAIL ADDRESS
APPLICANT			
Greenies Farm	OR Kwabe		greeniesfarms@gmail.com
NATIONAL AUTHORITY			
National Department of Water and Sanitation	Khuthadzo Mulaudzi	0123921408	mulaudzi@dws.gov.za
South African Heritage Resources Agency (SAHRA)			sngcatsha@sahra.org.za ; info@sahra.org.za
South African Heritage Resources Agency (SAHRA)	Natasha Higgitt	0214624502	nhiggitt@sahra.gov.za
PROVINCIAL AUTHORITY			
North West Provincial Government	Ouma Skosana		oskosana@nwpg.gov.za
Department of Agriculture, Forestry and Fisheries - North West	Mr Mahlaba	0183651007/0183895026/0183895157	malakiam@nwpg.gov.za
Department of Water and Sanitation, North West	Thato Mjona		MjonaT@dws.gov.za
LOCAL AUTHORITIES			
Bojanala Platinum District Municipality	Goitsimosimo Tau	0145904500	innocents@bojanala.gov.za
Ward Councillor	Councillor Ben Ramagapile Motswai	0823605828	
Bakwena Ba Mogopa Traditional Council	Chief Mamogale	0769953693	
Madibeng Local Municipality	Isaac Lekgetho	0123189100	isaaclekgetho@madibeng.gov.za / munman@madibeng.gov.za
OTHER STAKEHOLDERS			
Eskom	Charmaine Maré	083 556 6257	marecc@eskom.co.za
North West Parks Board			info@nwrb.org.za
RESIDENTS			

Figure 33: An abstract of the I&AP Register

8.2 Commenting Phase

8.2.1 Advertisement

The newspaper advertisement has been published on the *Brits Pos* where the notification for the Environmental Authorisation process has been made the details of the commenting period is outlined. A copy of the advertisement has been attached as Appendix E.

NOTICE OF ENVIRONMENTAL AUTHORISATION PROCESS
JULY 2021

Notice of Environmental Authorisation Application in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended; and the Environmental Impact Assessment Regulations (as published in Government Notice No. 327, 7th April 2017). This is with respect to the listed activities that have been triggered by the proposed road establishment of the Greenies Farm in Jericho, within the Madibeng Local Municipality. The proposed activity entails growing 100 tons of Nile Tilapia and estimated 600tons of vegetables in addition to a piggery and a poultry operation which triggers the following listed activities: Government Notice, No. R. 327, April 2017 (LN1) – Activity No. 3, 5, 6, 8, 12, 19 and 27 as well as Government Notice, No. R. 324, April 2017 (LN3) – Activity No. 13, 12 and 14.

INTERESTED AND AFFECTED PARTIES ARE INVITED TO REGISTER AND COMMENT ON THE DRAFT BASIC ASSESSMENT REPORT TO BE PLACED AT JERICHO LIBRARY FOR A PERIOD OF 30 DAYS i.e. 09 JULY 2021 to 10 AUGUST 2021.

Enquiries can be sent to Information Decision Systems (Ms. Vanessa Nkosi, Tel: 087 353 2576, Email: vanessa@lds-cc.co.za)

Alternatively, please access the document from one of the following platforms:

Google Drive Link:
<https://drive.google.com/drive/folders/1dPmyX4iZTURHalceuqk5Wbw-QQGTeNRJ?usp=sharing>

Facebook: Information Decision Systems
LinkedIn: Information Decision Systems

Figure 34: Proof of advertisement

8.2.2 Comments and Responses

The comments and responses have been summarised by the table below obtained from Phase 1 of the public participation process to date (Draft BAR).

Table 38: Summary of the comments and responses

Organisation	Name and contact details	Date	Comment	EAP response (if applicable)
South African Heritage Resource Agency	Elijah Katsetse Email: ekatsetse@sahra.org.za	10 th May 2021	<p>Dear Applicant,</p> <p>Kindly upload all documents pertaining to the Environmental Authorisation Application Process. As per section 24(4)b(iii) of NEMA and section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA.</p> <p>Once all documents including all appendices are uploaded to the case application, please ensure that the status of the case is changed from DRAFT to SUBMITTED. Please ensure that all documents produced as part of the EA process are submitted as part of the application.</p> <p>Best wishes,</p> <p>CaseReference:</p> <p>PROPOSED DEVELOPMENT OF THE GREENIES FARMS AQUAPONICS</p> <p>Add message to tracker:</p>	Documents have been uploaded to the SAHRA system as per comment.



8.3 Notification Phase

Following receipt of the decision from North West Department of Economic Development, Environment, Conservation and Tourism, all registered I&APs will be notified of the decision and the appeal process.



9 IMPACT ASSESSMENT

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

9.1 Methodology

The method used to determine the significance of impacts associated with the development was motivated by the Department of Environmental Affairs Series 5 of Impact Significance. This method is known as the systematic method which follows the criteria that includes;

- extent or spatial scale of the impact;
- intensity or severity of the impact;
- duration of the impact;
- mitigatory potential; and
- acceptability.

in description, the criteria is defined:

- **Nature:** A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- **Duration:** Indicates what the lifetime of the impact will be;
- **Intensity:** Describes whether an impact is destructive or benign;
- **Probability:** Describes the likelihood of an impact actually occurring; and
- **Cumulative:** In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The criteria to be used for the rating of impacts are provided in **Table 39**.

Table 39: Criteria to be used for the rating of impacts

Score	Rating	Description
Consequence Descriptors		
Severity or Intensity – defines the magnitude of the impact		
5	High	Natural, cultural and social functions and processes are altered to extent that they permanently cease
4	Moderately High	Natural, cultural and social functions and processes are altered to extent that they are severely impaired and may temporarily cease
3	Moderate	Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way
2	Moderately Low	Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a slightly modified way
1	Low	Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
Extent – relates to the extent of the impact		
5	Entire system	Entire habitat unit / Entire system/ > 2000ha impacted / Linear developments affected >3000m
4	Regional	Regional within 5 km of the site boundary / < 2000ha impacted / Linear developments affected < 3000m
3	Local	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear developments affected < 1000m
2	Larger site boundary	Development specific/ within the site boundary / < 100ha impacted / Linear developments affected < 100m
1	Immediate site	Activity specific/ < 5 ha impacted / Linear developments affected < 100m



Score	Rating	Description
Duration – relates to the duration of the impact		
5	Permanent	The impact will continue indefinitely and is irreversible
4	Long term	Life of operation
3	Medium term	One year to five years
2	Medium short	One month to one year
1	Short term	One day to one month
Likelihood Descriptors		
Probability – relates to the likelihood of the impact occurring		
5	Definite	More than 75% chance of occurrence. The impact is known to occur regularly under similar conditions and settings
4	Highly likely	The impact has a 41 - 75% chance of occurring and thus is likely to occur. The impact is known to occur sporadically in similar conditions and settings
3	Likely	The impact has a 10 - 40% chance of occurring. This impact may / could occur and is known to occur in low frequencies under the similar conditions and settings
2	Possible	The possibility of the impact occurring is low with less than 10% chance of occurring. The impact has not been known to occur under similar conditions and settings
1	Highly unlikely	The possibility of the impact occurring is negligible and only under exceptional circumstances
Severity of Impact		
5	Natural, cultural, social aspect very highly sensitive/important	
4	Natural, cultural, social aspect highly sensitive/important	
3	Natural, cultural, social aspect moderately sensitive/important	
2	Natural, cultural, social aspect limited sensitivity/importance	
1	Natural, cultural, social aspect not sensitive/important	

Significance is determined through a synthesis of impact characteristics (Table 40). Significance is also an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact. Impact significance is expressed as:

$$\text{Significance} = \text{Likelihood (Frequency of the activity + Frequency of impact)} \times \text{Consequence (Severity + Extent + Duration)}$$

Table 40: Significance rating matrix

		CONSEQUENCE (Severity + Spatial Scope + Duration)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LIKELIHOOD (Frequency of activity + Frequency of impact)	1	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	2	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	3	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	4	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
	6	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180
	7	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210
	8	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	9	18	36	54	72	90	108	126	144	162	180	198	216	234	252	270
	10	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300



Table 41: Impact significance categories

Significance Rating	Value	Impact Management Recommendation	Positive Impact Management Recommendation
Very High	126-150	Critically consider the viability of proposed projects. Improve current management of existing projects significantly and immediately	Maintain current management
High	101-125	Comprehensively consider the viability of proposed projects. Improve current management of existing projects significantly	Maintain current management
Medium-high	76-100	Consider the viability of proposed projects. Improve current management of existing projects.	Maintain current management
Medium-low	51-75	Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy.	Maintain current management and/or proposed project criteria and strive for continuous improvement
Low	25-50	Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy	Maintain current management and/or proposed project criteria and strive for continuous improvement
Very Low	1-25	Maintain current management and/or proposed project criteria and strive for continuous improvement.	Maintain current management and/or proposed project criteria and strive for continuous improvement
Neutral	/	Impact is neither positive or negative	



9.2 Impacts and Significance

The section below describes the significance and impacts of the proposed development during the construction, operational and decommissioning phase. In addition, provision has been made for the no-go alternative and the cumulative impacts.

9.2.1 Construction Phase

Table 42: Impacts associated with the proposed development during the construction phase

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
<p>Activity: Site preparation prior to construction</p> <p>Impact:</p> <ul style="list-style-type: none"> Exposure of soils, leading to increased runoff, erosion and stream incision, and thus increased sedimentation of the watercourse; Increased sedimentation of freshwater habitat, leading to smothering of flora and benthic biota and potentially further altering surface water quality; and Decreased ecoservice provision; and Proliferation of alien vegetation as a result of disturbances. 	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>96</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	96	Medium High		<ul style="list-style-type: none"> Existing dirt road should be used to gain access to the site. Crossing wetlands must be minimized. Removal of vegetation must be minimized, and indigenous vegetation must be kept as much as possible. It is preferable that construction takes place during the dry season (as much as possible) to reduce the erosion potential of the exposed surfaces; 	Low
Significance	Rating	Negative							
96	Medium High								
<p>Activity:</p> <ul style="list-style-type: none"> Clearing of vegetation to facilitate the development infrastructure. <p>Impact</p> <ul style="list-style-type: none"> Removal of existing vegetation community which includes the loss of an Ecological Support 	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>54</td> <td>Medium Low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	54	Medium Low		<ul style="list-style-type: none"> The footprint area associated with the infrastructure construction must be minimised, avoiding sensitive habitat where possible. Areas earmarked for the infrastructure must be marked to ensure a controlled disturbance footprint area. The recommended 20m buffer zone has to be respected at all times. All areas outside of the project area are to be considered as a No-Go area, to limit the development footprint. It is also deemed important that the entire delineated wetland area be demarcated as sensitive areas, and no construction activity, laydown yards, camps or dumping of construction material are to be permitted within the sensitive zones 	Low
Significance	Rating	Negative							
54	Medium Low								



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Area (ESA) and a vulnerable ecosystem during construction.		<ul style="list-style-type: none"> Erosion prevention and sediment control measures are imperative and need to be implemented throughout the entire project footprint area of the proposed pipeline, access roads and temporary laydown / storage sites. Temporary erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching. These control measures are only applicable for the section of the wetland and Contamination of the river system with unset cement or cement powder should be negated as it is detrimental to aquatic biota. It is preferable that on-site mixing is avoided and that only prefabricated materials are used. 							
Activity: Stripping and stockpiling topsoil Impact: <ul style="list-style-type: none"> altering hydromorphic soils 	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>96</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	96	Medium High		<ul style="list-style-type: none"> The first 300 mm of soil must be stockpiled separate from the soil excavated deeper than 300 mm 	Low
Significance	Rating	Negative							
96	Medium High								
Activity: Excavations Impact: <ul style="list-style-type: none"> Loss of wetland habitat and altering hydromorphic soils 	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> No "non-essential" vehicles or activities, dumping or clearing is permitted within the delineated wetland 	Low
Significance	Rating	Negative							
80	Medium High								
Disturbance and mortality of faunal species due to habitat loss	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>96</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	96	Medium High		<ul style="list-style-type: none"> Construction and Operational Phase activities must be limited to the development footprint area within the project area. The areas where vegetation and habitat remain undisturbed, should be avoided for faunal and floral habitat to be maintained in their present state. 	Low
Significance	Rating	Negative							
96	Medium High								
Further infestation of alien and invasive plant species	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>70</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	70	Medium High		<ul style="list-style-type: none"> Carefully regulate / limit access by vehicles and materials to the construction site. Demarcate or fence in the construction area. Prohibit the introduction of domestic animals such as dogs and cats. Remove any woody alien species that germinate. Plant only locally indigenous flora if landscaping needs to be done Keep construction activities neat and tidy. When complete, remove all sand piles and landscape all uneven ground while re-establishing a good topsoil layer. Remove Category species using mechanical methods, and minimize soil disturbance as far as possible. 	
Significance	Rating	Negative							
70	Medium High								
Displacement of flora and faunal community due to habitat loss, direct mortalities and disturbance	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>50</td> <td>Medium Low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	50	Medium Low		<ul style="list-style-type: none"> Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species; 	Low
Significance	Rating	Negative							
50	Medium Low								



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
		<ul style="list-style-type: none"> If any faunal SSC are recorded during construction, activities should temporarily cease, and time permitted for the species to move away. In the event the species do not move away (voluntarily), the species must be removed safely from the area and relocated to a suitable area that will not be directly disturbed by the project; Fauna species such as frogs and reptiles that have not moved away should be carefully and safely removed to a suitable location beyond the extent of the development footprint by a suitably qualified ECO trained in the handling and relocation of animals; All termite mounds within the project area should be protected, as these provide habitat for potentially occurring reptile SCC (namely the Striped Harlequin Snake); and The intentional killing of any animals including snakes, insects, lizards, birds or other animals should be strictly prohibited. General waste must be collected into suitable water, wind and animal proof waste containers so that it can be removed to a disposal site on a regular basis; Filter waste must be composted and not disposed of via postproduction water resources; A suitable bulk service provider must be contracted to remove processing waste; and Waste must be removed to a recognized disposal site equipped to deal with the waste type of animal waste 							
Soil erosion	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium High		<ul style="list-style-type: none"> Soil erosion preventative structures should be built around erosive activities, such as the avoidance of water runoff, and the construction of a drainage system; and Where vegetation has been cleared, a rough ground cover structure must be created, to avoid runoff but still permitting infiltration, such as 'Rock Ground Cover Landscaping Rocks' or similar structures built. 	Low
Significance	Rating	Negative							
60	Medium High								
Spread of invasive fish species into the nearby river system and the Limpopo catchment	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>120</td> <td>High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	120	High		<ul style="list-style-type: none"> Ensure the proper management of the closed system; The development of a storm water management plan; Monitor for any malfunctioning of the closed system infrastructure on a regular basis. 	Medium Low
Significance	Rating	Negative							
120	High								
The loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>78</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	78	Medium High		<ul style="list-style-type: none"> Monitor for any malfunctioning of the closed system infrastructure on a regular basis; and A buffer zone must be established around the development footprint, to absorb any malfunctions which may occur during the operational phase and may affect the surrounding environment; and A concrete wall must be built around the development footprint structures, to create a barrier from the surrounding environment. 	Low
Significance	Rating	Negative							
78	Medium High								
An increase of pests due to the mismanagement of waste and bad odours	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium High		<ul style="list-style-type: none"> General waste must be collected into suitable water, wind and animal proof waste containers so that it can be removed to a disposal site; 	Low
Significance	Rating	Negative							
60	Medium High								



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
		<ul style="list-style-type: none"> Old feed should be disposed of via composting (for small volumes) or via a formalized waste disposal system (for large volumes). Filter waste must be composted and not disposed of via postproduction water resources; A suitable bulk service provider must be contracted to remove processing waste; and Waste must be removed to a recognized disposal site equipped to deal with the waste type 							
Waste generation	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<p>Storage areas for material and equipment shall be situated in a position as agreed in consultation with the ECO. These areas shall be secured to prevent unintended damage or pollution to the environment. All hazardous substances shall be stored within a secured storage area, with impervious lining and bunding. Drip trays must be used where appropriate.</p> <p>General Waste</p> <ul style="list-style-type: none"> Solid waste generated must be disposed of at the registered landfill site. Bins and / or skips shall be provided at convenient intervals for disposal of waste along the work areas and in the construction camp. Recyclable waste shall be separated, reused and recycled at approved facilities. Proof shall be available. Different waste bins, for different waste streams, shall be provided to ensure correct waste separation. <p>Sewage/ waste water and infrastructure</p> <ul style="list-style-type: none"> Discharge of waste from temporary chemical toilets into the environment must be strictly prohibited. Ensure that adequate containment structures are provided for the storage of construction materials on site. Ensure the adequate removal and disposal of construction waste and material <p>Hazardous waste</p> <ul style="list-style-type: none"> Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site. The contractor must provide proof of disposal Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container shall be covered with a lid). 	Low
	Significance	Rating	Negative						
80	Medium High								



Potential impacts:	Significance rating of impacts (positive or negative):			Proposed mitigation:	Significance rating of impacts after mitigation:
Reduction in air quality due to the generation of dust caused by construction activities	Significance 56	Rating Medium Low	Negative	<ul style="list-style-type: none"> All exposed surfaces must be re-vegetated and/or stabilized as soon as is practically possible. No burning of waste, such as plastic bags, cement bags and litter, must be permitted at the contractor or restoration sites A complaints register is provided on the EMPr to report any excessive dust incidents The Contractor must make alternative arrangements (other than fires) for cooking and / or heating requirements. LPG gas cookers may be used provided that all safety regulations are followed. 	Very Low
Increase in run off due to the removal of vegetation and paving	Significance 60	Rating Medium Low	Negative	<ul style="list-style-type: none"> The storm water management plan must be incorporated into the site plan of the proposed development site to prevent erosion and the associated sedimentation located in the riparian and instreams areas since this area contains the aquatic macroinvertebrate species that rely on this aquatic ecosystem. The runoff from the paved surface, access roads, and cleared areas need to be curtailed. The runoff from the paved surface should be slow down by using the strategic plan of placement of beams. The erosion beam should be installed to prevent siltation of the riparian resources and gully formation. The following points should be used as the guide when placing the erosion berms: <ul style="list-style-type: none"> When the track slope is less than 2%, beams should be installed every 50m. When the track slope is between 2% and 10%, beams should be installed every 25m. When the track slope is between 10% and 15%, beams should be installed every 20m. When the track slope is more than 15%, beams should be installed every 10m. 	Low
Impact on the aquatic and wetland system	Significance 60	Rating Medium Low	Negative	<ul style="list-style-type: none"> All the riparian areas that have been affected during the construction should be rehabilitated upon the completion of the proposed development by reseeding the area with the indigenous grasses. All the rehabilitated areas should be rehabilitated to a point that the natural processes will allow the predevelopment ecological functioning and biodiversity of the area that has been re-instated. The ongoing biomonitoring of the aquatic macroinvertebrate species found around the proposed development area should occur. It should take place in a point located upstream and downstream of the activities. The biomonitoring should take place on a 6-monthly basis in the spring and autumn of each year. It should take place using the SASS5. This is to ensure that the runoff from the proposed site does not affect the water quality and biota found in Tolwane River. The toxicity testing of any features located in the proposed development site which contain water that may come into contact with the receiving environment as well as the areas indicating pollution plume as a result of the proposed development project must be tested on a 6 monthly basis together with the biomonitoring surveys. All the designated roadways must be tarred to prevent runoff and soil erosion that will results from the vehicles driving in the proposed development area. 	Low



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
		<ul style="list-style-type: none"> The refuelling of a vehicle taking place in the site must be done on a sealed surface area that is surrounded by the beams to prevent the ingress of hydrocarbons into the topsoil and all the vehicles must be regularly inspected for any leaks. 							
Social Impacts (Residents)	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th></th> </tr> </thead> <tbody> <tr> <td>150</td> <td>Very High</td> <td>Positive</td> </tr> </tbody> </table>	Significance	Rating		150	Very High	Positive	<p>Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area during construction.</p> <p>Local communities or local community organizations shall be given preference in supplying services and labor to the construction activities. A roster of "temporary labor" must be kept indicating "origin" of employee.</p> <p>Temporary structures on site must be located such that they have as little visual impact on local residents as possible. Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</p> <p>Lighting on the construction site must be pointed downwards and away from oncoming traffic and nearby houses.</p>	Very Low
Significance	Rating								
150	Very High	Positive							
Noise Pollution	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th></th> </tr> </thead> <tbody> <tr> <td>70</td> <td>Medium Low</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating		70	Medium Low	Negative	<ul style="list-style-type: none"> Construction activities must be undertaken according to working hours stipulated by the Applicant i.e. during daylight hours only. Construction vehicles and equipment generating excessive noise must be fitted with appropriate noise abatement measures Construction workers must be provided with the appropriate PPE i.e. ear plugs. A complaints register shall be provided to record any complaints regarding excessive noise. All complaints received must be investigated and a response given to the complainant within 14 days. 	Low
Significance	Rating								
70	Medium Low	Negative							
Water Pollution	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th></th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating		80	Medium High	Negative	<p>Storm water</p> <ul style="list-style-type: none"> To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and if necessary, the drainage system must be assessed accordingly. A drainage plan must then be submitted by the Applicant for approval by the ECO. Temporary cut off drains and berms may be required to capture storm water and promote infiltration. Storm water must be disposed of without causing soil saturation, erosion, sloughing and without affecting the integrity of the stream. The storm water leaving the site premises must in no way be contaminated by any substance, whether such substance is a solid, liquid, vapor or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises. 	Low
Significance	Rating								
80	Medium High	Negative							



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
		<p>Water Quality</p> <ul style="list-style-type: none"> Storage areas that contain hazardous substances must be bunded with an approved impermeable liner Spills in bunded areas must be cleaned up, removed and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these should then be disposed of to a suitable waste site. Every effort should be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site Site staff shall not be permitted to use the stream for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Applicant) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc. Deterioration of water quality needs to be avoided and the current PES must be maintained or improved upon Ensure that adequate containment structures are provided for the storage of construction materials on site. Ensure the adequate removal and disposal of construction waste and material 							
Disturbance and loss of heritage resource	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium low		<ul style="list-style-type: none"> A Chance finds procedure (CFP) should also be implemented in the event that stone tools are identified underground 	Low
Significance	Rating	Negative							
60	Medium low								
Visual Impacts	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>Medium low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	56	Medium low		<ul style="list-style-type: none"> No specific mitigation measures are required other than standard construction site housekeeping and dust suppression. <p>These are included below:</p> <ul style="list-style-type: none"> The contractor(s) should maintain good housekeeping on site to avoid litter and minimise waste. Litter and rubble should be timeously removed from the construction site and disposed at a licenced waste disposal facility. The project developer should demarcate construction boundaries and minimise areas of surface disturbance. Appropriate plans should be in place to minimise fire hazards and dust generation. Night lighting of the construction site should be minimised within requirements of safety and efficiency. 	Low
Significance	Rating	Negative							
56	Medium low								



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Health and safety	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>Medium low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	56	Medium low		<ul style="list-style-type: none"> Ensure that a skilled and competent Contractor is appointed during the construction phase. The Contractor must be evaluated during the tender/appointment process in terms of safety standards. The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate. The Contractor must undertake a Construction Phase Risk Assessment. A Construction Site Manager or Safety Supervisor should be appointed, in conjunction with the project manager, to monitor all safety aspects during the construction phase. This could be the same person that is assigned to co-ordinate the construction traffic. 	Low
Significance	Rating	Negative							
56	Medium low								
Traffic, congestion and potential for collisions	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>Medium low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	56	Medium low		<ul style="list-style-type: none"> Ensure that roads are not closed during construction, which may restrict access for emergency services. The Contractor must ensure that all construction personnel are provided with adequate PPE for use where appropriate. 	Low
Significance	Rating	Negative							
56	Medium low								

9.2.2 Operational Phase

Table 43: Impacts associated with the proposed development during the operational phase

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Impact on natural vegetation	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium low		<ul style="list-style-type: none"> Development should be contained within the development footprint of the development and unnecessary disturbance remainder of the site should be avoided. The indigenous vegetation, and especially the trees, should be retained as far as possible and buildings should be placed between trees. Protected trees should be conserved and not destroyed. The denuded and disturbed areas should be re-vegetated with indigenous species as soon as possible. No trees may be damaged or cut. No exotic trees may be planted in the gardens, use only indigenous plants. Existing and dedicated roads should be marked and utilised by vehicles 	Low
Significance	Rating	Negative							
60	Medium low								
Dewatering the borehole	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>Medium Low</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	56	Medium Low		<ul style="list-style-type: none"> Groundwater depletion may take place at the abstraction borehole if not managed correctly as such the borehole should be managed constantly Groundwater levels should be monitored regularly Discharge water from the processing operations should be disposed of in a safe manner, should the water become contaminated over time it should either be stored in dedicated PCD's for reuse at the processing plant or treated prior to discharging into the environment. 	Low
Significance	Rating	Negative							
56	Medium Low								



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Hydrocarbon spills	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> Farm employees and supervisors at workshops, yellow metal laydown areas and fuel storage areas should be trained in hydrocarbon spill response and each of these areas should be equipped with the appropriate spill response kits Contaminated soil must be disposed of correctly at a suitable location. Should these management measures be put in place the impact on the receiving environment would be reduced to a low impact 	Low
Significance	Rating	Negative							
80	Medium High								
Contamination from waste water produced and fish waste	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> Ensure that the facility is designed in accordance with international best practice norms, and with advice from an appropriate specialist, to ensure that there is no environmental contamination from effluent, fodder, carcasses and other waste, and to ensure that there is also effective storm water management. Adhere to best practice of waste disposal norms. Establish appropriate emergency procedures for accidental contamination of the surroundings. Waste recycling must be incorporated into the facility's operations as far as possible. Designate a secured, access restricted, signposted room for the storage of potentially hazardous substances such as herbicides, pesticides dips and medications. All hazardous waste should be disposed of at an appropriate licensed facility for this. Rehabilitate contaminated areas immediately in accordance with advice from appropriate contamination and environmental specialists. Educate workers regarding the handling of hazardous substances and about waste management and emergency procedures with regular training and notices and talks. Faeces from the fish tanks should flow immediately to the mechanical filter without being crushed on the way. The higher the rate of recirculation the less new water will be used, and the less discharge water will need to be treated 	Low
Significance	Rating	Negative							
80	Medium High								
Sewerage waste management	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> All wastewater application on land must be in accordance with the DWS's guidelines in terms of wastewater use. Ensure adherence to wetland buffer zones and soil quality monitoring requirements as stipulated in these guidelines. The depth to aquifer must be more than 5m for dewatered sludge application and must be more than 10m for liquid sludge application. The distance from surface water or borehole must be more than 400m. Mortalities must be stored in an enclosed area prior to being taken to the mortality pit. The mortality pit must be regularly monitored and maintained, avoiding exceeding the capacity of the pit. 	Low
Significance	Rating	Negative							
80	Medium High								



Potential impacts:	Significance rating of impacts (positive or negative):			Proposed mitigation:	Significance rating of impacts after mitigation:
Soil and water pollution due to poor waste management	Significance 70	Rating Medium High	Negative	<ul style="list-style-type: none"> Waste containers must be available on site at all times. A waste management plan must be adopted and implemented. This plan should consider the type of waste, storage, disposal method and facility as well as methods to reduce waste on site. Ensure compliance with waste management legislation. Faeces from the fish tanks should flow immediately to the mechanical filter without being crushed on the way. The higher the rate of recirculation the less new water will be used, and the less discharge water will need to be treated 	
Spread of diseases during operational activities	Significance 50	Rating Medium Low	Negative	<ul style="list-style-type: none"> Eggs, pigs or fish stocked in the facility must be absolutely disease free and preferably from a certified disease free strain. Water used must be disease free or sterilised before going into the system; it is far better to use water from a borehole, as well, or a similar source than to use water coming directly from the sea, river or lake. No visitors or stuff should enter the farm sick Fish mortalities must be identified and removed immediately from the fish tank. Training of workers to effectively handle sick and dead animals. Emergency procedures that aim to address the potential for disease outbreaks must be developed and implemented where applicable. Maintain appropriate pest control measures Effectively maintain and seal all pipes and reservoirs containing slurry, to prevent animals from accessing the effluent. 	Low
Soil erosion due to loss of natural ground cover	Significance 60	Rating Medium High	Negative	<ul style="list-style-type: none"> Soil erosion preventative structures should be built around erosive activities, such as the avoidance of water runoff, and the construction of a drainage system; and Where vegetation has been cleared, a rough ground cover structure must be created, to avoid runoff but still permitting infiltration, such as 'Rock Ground Cover Landscaping Rocks' or similar structures built. 	Low
Stormwater management	Significance 60	Rating Medium High	Negative	<ul style="list-style-type: none"> Stormwater management measures must be evaluated frequently to ensure proper functioning of stormwater structures. An operational phase Stormwater Management Plan must be designed and implemented, with a view to prevent the passage of concentrated flows from hardened surfaces and onto natural areas. 	Low



Potential impacts:	Significance rating of impacts (positive or negative):			Proposed mitigation:	Significance rating of impacts after mitigation:
Introduction of alien species	Significance 78	Rating Medium High	Negative	<ul style="list-style-type: none"> limit access by vehicles and materials to the site Prohibit the introduction of domestic animals such as dogs and cats. Plant only locally indigenous flora if landscaping needs to be done. Employ best practices regarding tilling of soil and weed management Minimize the accumulation or dispersal of excess fodder on site. Remove Category species using mechanical methods, and minimize soil disturbance as far as possible. Alien debris could be donated to a local community. 	Low
An increase of pests due to the mismanagement of waste and bad odours	Significance 60	Rating Medium High	Negative	<ul style="list-style-type: none"> General waste must be collected into suitable water, wind and animal proof waste containers so that it can be removed to a disposal site; Old feed should be disposed of via composting (for small volumes) or via a formalised waste disposal system (for large volumes). Filter waste must be composted and not disposed of via postproduction water resources; A suitable bulk service provider must be contracted to remove processing waste; and Waste must be removed to a recognised disposal site equipped to deal with the waste type 	Low
Local economy enhancement	Significance 78	Rating Medium High	Positive	<ul style="list-style-type: none"> Ensure that the proposed infrastructure is maintained appropriately to ensure that all facilities and infrastructure operate within its design capacity to deliver as the market requires. Enhance the use of local labour and local skills as far as reasonably possible. Where the required skills cannot be acquired locally, and where appropriate and applicable, ensure that relevant local individuals are trained. Ensure that an equitable percentage allocation is provided for local labour employment as well as specify the use of small to-medium enterprises and training specifications in the Contractors contract. Ensure that goods and services are sourced from the local and regional economy as far as reasonably possible 	Low
Reduction in air quality due to the operational activities	Significance 56	Rating Medium Low	Negative	<ul style="list-style-type: none"> Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) must be provided at the terminal as required. Mobile fire-fighting equipment should be provided at the berths as a safety precaution during the vessel offloading process. It should be noted that the products planned to be stored at the terminal have high flash points and low volatility. As a result, fires are unlikely, unsustainable, and can be extinguished with basic fire water and portable fire extinguishers. Efficient movement of traffic through the entrance and exit in order to reduce congestion and vehicle emissions. Ensure that the facility is operated in such a manner whereby potential odours are minimised 	Very Low



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Health and Safety	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium Low</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium Low	Negative	<ul style="list-style-type: none"> An Emergency Plan must be drafted and approved in order to deal with potential spillages and fires. Records of practices should be kept on site. Frequent inspections must be implemented by operating personnel in order to assure and verify the integrity of hoses, piping and other structures. Portable fire extinguishers and fire water hydrants (i.e. appropriate fire-fighting equipment) should be provided at the facility as required.. 	Low
Significance	Rating	Negative							
60	Medium Low	Negative							

9.2.3 Cumulative Impacts

Additional infrastructure development, for example, water pipelines, power lines and access roads and the spread of alien invaders due to loss of natural vegetation will exacerbate the negative impact of the development on the vegetation and will lead to a loss of habitat for indigenous fauna and flora.

9.2.4 No-go alternative

Table 44: Description of the No-Go alternative

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
<ul style="list-style-type: none"> The No-Go alternative involves not developing the proposed aquaculture farm with the aim of uplifting local economy. 	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>150</td> <td>Very High</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating	Negative	150	Very High	Negative	Implementation of proposed development	Low
Significance	Rating	Negative							
150	Very High	Negative							

9.2.5 Closure Phase and rehabilitation

Table 45: Impacts associated with the proposed development during the closure phase

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
Introduction and proliferation of alien species	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>Medium low</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating	Negative	60	Medium low	Negative	<ul style="list-style-type: none"> Remove Category species using mechanical methods, and minimize soil disturbance as far as possible 	Low
Significance	Rating	Negative							
60	Medium low	Negative							
Soil erosion	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>56</td> <td>Medium Low</td> <td>Negative</td> </tr> </tbody> </table>	Significance	Rating	Negative	56	Medium Low	Negative	<ul style="list-style-type: none"> Limit vehicles to the construction site Closure activities must commence in winter where soil erosion is limited Revegetate exposed areas with locally indigenous flora immediately 	Low
Significance	Rating	Negative							
56	Medium Low	Negative							



Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation:	Significance rating of impacts after mitigation:						
		<ul style="list-style-type: none"> Implement erosion protection measures on site to reduce erosion and sedimentation of the local drainage system. Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road Discharge water from the processing operations should be disposed of in a safe manner, should the water become contaminated over time it should either be stored in dedicated PCD's for reuse at the processing plant or treated prior to discharging into the environment. 							
Disturbance of fauna due to noise	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> Commence (and preferably complete) demolition / rehabilitation during winter, when the risk of disturbing active (including breeding and migratory) animals, should be least. Minimize noise to limit its impact on sensitive fauna. Limit demolition activities to day time hours Minimize or eliminate security and other lighting, to reduce the disturbance of nocturnal fauna 	Low
Significance	Rating	Negative							
80	Medium High								
Stormwater management	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	80	Medium High		<ul style="list-style-type: none"> The appointed Contractor should compile a Method Statement for Stormwater Management during the closure phase. Provide secure storage for oil, chemicals and other waste materials to prevent contamination of stormwater runoff. 	Low
Significance	Rating	Negative							
80	Medium High								
Dust emissions	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>70</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	70	Medium High		<ul style="list-style-type: none"> Ensure that cleared (excavated) areas and unpaved surfaces are sprayed with water (obtained from an approved source) to minimise dust generation. Approved soil erosion mitigation measures may be utilised to limit dust generation. Ensure that closure vehicles travelling on unpaved roads do not exceed a speed limit of 40 km/hour. 	Low
Significance	Rating	Negative							
70	Medium High								
Noise generation	<table border="1"> <thead> <tr> <th>Significance</th> <th>Rating</th> <th>Negative</th> </tr> </thead> <tbody> <tr> <td>70</td> <td>Medium High</td> <td></td> </tr> </tbody> </table>	Significance	Rating	Negative	70	Medium High		<ul style="list-style-type: none"> A method statement, including detailed procedures, must be drawn up prior to any closure of existing tanks. Decommissioning personnel must wear proper hearing protection, which should be specified as part of the Decommissioning Phase Risk Assessment carried out by the Contractor. The Contractor must ensure that all decommissioning personnel are provided with adequate PPE, where appropriate 	
Significance	Rating	Negative							
70	Medium High								



9.3 Environmental Impact Statement

9.3.1 Key Findings

9.3.1.1 Aquatic and Wetland Assessment

The aquatic macroinvertebrate species that are found near the proposed development site have already been significantly disturbed by the agricultural activities and the sand mining that are taking place in the river catchment area upstream. Most of the impact that occurs within the local area will have a permanent impact and has a high potential of increasing the existing impact on the Tolwane River which is the receiving environment. If the mitigation measures are implemented, the likelihood of the consequence of the impacts will be significantly reduced to either moderate or low levels.

9.3.1.2 Terrestrial Biodiversity Assessment

The terrestrial study conducted for the proposed development of the Greenies farm aquaponics system and agricultural systems, is based on thorough desktop and field verification along with an evaluation of the current state of the environment.

Based on the field survey conducted on the 19th of May 2021 for the site, no species of conservation concern were noted, and it is evident that the area has been disturbed by anthropogenic activities. The proposed project area shows signs of bush encroachment and the presence of alien invasive species, due to overgrazing, regular clearing of vegetation, ploughing lines and vehicle paths which traverse through the project area.

Even though the project area is noted to be within an ESA and a CBA, the anthropogenic activities as mentioned above has altered the natural state of the environment in a manner that has decreased the ecological function of the project area.

All impacts are noted to have a high, medium-high, medium or medium-low significance before mitigation measure can be implemented. These significance ratings are due to the removal of vegetation from the development footprint size, causing soil erosion, habitat loss, faunal and floral disturbance, and the infestation of alien invasive species. The generation of waste caused by the type of activity (agriculture), causes a higher significance rating, leading to bad odours in and around the study area and the potential transmission of disease-causing microbes. This aspect and related impacts affect the site as well as neighboring areas, should the waste enter the watercourse. In addition to the above, the spread of invasive fish species into the nearby river system and the Limpopo catchment and the loss of floral, faunal and aquatic species due to flooding or the mismanagement of the close aquaculture system, is very important to consider as it is noted to have a high significance with regards to the impact on the environment. All impacts are however noted to have a low or very low significance rating in the event that all mitigation measures are strictly adhered to.

9.3.2 Heritage Impact Assessment

The Heritage Study concluded that the proposed project is acceptable, therefore the provincial heritage authority to exercise their discretion and offer a positive review to the application. Due to the lack of apparent significant heritage resources no further mitigation is required prior to construction. A Chance Find Procedure should be implemented for the project should any sites be identified during the construction process.



9.3.3 Sensitivity Mapping

A cumulative sensitivity map has been drafted for the proposed development.

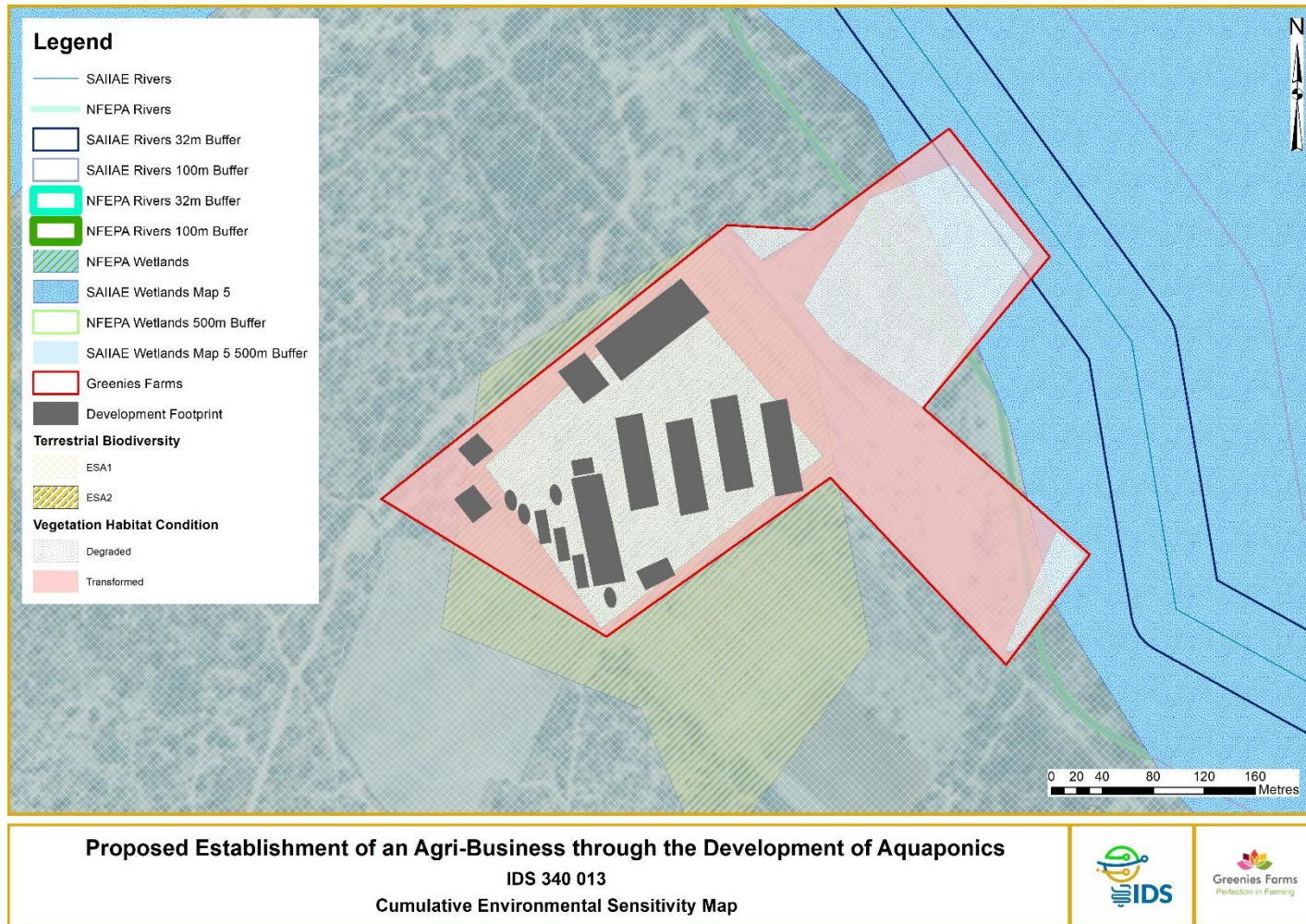


Figure 35: Cumulative sensitivity mapping



9.4 Assumptions, uncertainties or gaps in knowledge

9.4.1 Aquatic and Wetland Assessment

- The water resource assessment was based on the results of a single low flow season survey only. Therefore, the temporal trends of the system could not be generated and interpreted. Furthermore, the biota collected during the survey does not represent a comprehensive list of species potentially found within the reach, this is due to time constraints in the field.
- The spatial data might not be accurate or based on outdated features.
- Only wetlands that were likely to be impacted by proposed development activities were assessed in the field. Wetlands located within a 500 m radius (or regulation area) of the project area but not in a position within the landscape to be measurably affected by the developments were not considered as part of this assessment.
- Areas characterized by external wetland indicators have been the focus of this study. Areas lacking these characteristics, i.e., built-up areas, disturbed areas, etc., have not been focused on.
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.
- Only defined watercourses by NFEPA and SAIIE were considered in the aquatic assessment study.

9.4.2 Terrestrial Biodiversity Assessment

- Due to the nature of fauna and flora, not all species were likely to have been seen and recorded during the time of the survey. It is for this reason that existing literature is consulted in conjunction with field survey results; and
- The information represented in this report is based on a site survey conducted on the 19th of May (Autumn). For more accurate results, it is feasible to conduct site surveys during each season.

9.4.3 Heritage Impact Assessment

- The investigation was influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in establishing intangible heritage values. It should be remembered that archaeological deposits (including graves and traces of mining heritage) usually occur below the ground level.
- Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted immediately, and a competent heritage practitioner or SAHRA must be notified in order for an investigation and evaluation of the find(s) to take place
- Recommendations contained in this document do not exempt the developer from complying with any national, provincial, and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA.
- The author assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report.
- The field survey did not include any form of subsurface inspection beyond the inspection of burrows, road cut sections, and the sections exposed by erosion or field ploughing.

9.5 Recommendations

The recommendation below were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

- The development of an alien invasive vegetation control and removal plan, which will be implemented during construction and the operational phase of the project;
- A waste management plan for all waste generated during the operational phase of the project must be developed prior to construction taking place;
- Undertaking water quality monitoring (bi-annual) during the operational phase of the project to ensure the waste generated is not affecting nearby water courses and aquatic faunal species;
- The development of a Storm water management plan;
- The development of a Fire management plan; and



- Borehole monitoring on a bi-annual period, for water quality management, during the construction and operational phase.
- Furthermore, alien species such as *Orochromis niloticus* and *Lemnaceae* may not be released into the surrounding watercourses and be kept in secure facility to prevent alien invasion and biodiversity loss.
- The river flow downstream still needs to be maintained of any disturbed areas to ensure the ongoing viability of aquatic macroinvertebrate species in these areas.
- The water quality parameters as mentioned in section 2.1.1 need to be managed and monitored especially the pH and DO. This is done to ensure that the reasonable water quality occurs downstream of the proposed development site. This will allow the ongoing survival of aquatic macroinvertebrate species diversity and reasonable sensitivity.
- Make sure that all the activities that are taking place within the proposed development area take the wetland and riverine boundaries into account. No activities should take place within the riverine and wetland boundaries unless it is unavoidable.
- Based on the depression wetland that was discovered in the site, no activity should take place within the depression and within the 20m buffer from the depression.
- No construction should take place within the 100m buffer from the river as this area is considered as riparian area.
- No infrastructure should be placed within the 32m buffer from any aquatic resources because this area is considered a riparian area.
- Demarcate all the riverine and wetland boundaries.
- No vehicle to drive through or enter the demarcated area except when there is a designated roadway.
- The vehicles should be also restricted from traveling only on the designated roadways in order to limit the ecological footprint of the proposed development activities.
- No dumping or any other materials is allowed within or on the boundary of the wetland and riverine system.
- No activities should take place on the riverine and wetland boundary. If this is unavoidable, a relevant authorisation must be obtained according to the National Environmental Management Act (NEMA) 107 of 1998 and Section 21 c and i of the National Water Act 36 of 1998.
- No dirty water from the runoff should reach the drainage features in the proposed development area and the requirement of regulation GN 704 of the National Water Act (Act 36 of 1998) needs to be clarified and strictly adhered to.

10 FINANCIAL PROVISION

No financial provision is required for this type of development in terms of Chapter 2 of the EIA Regulations 2014 as amended. Chapter 2 section 4 states that an applicant or holder of a right or permit must determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining or production operations, as contemplated in the Act and to the satisfaction of the Minister responsible for mineral resources.

11 EAP CONCLUDING STATEMENT

Based on the findings of the Basic Assessment process for Greenies Farm Aquaponics project, it is the opinion of the EAP that the project is authorised on condition that the mitigation measures provided within this report and the EMPr are met and complied with. The EMPr therefore has been identified as an extension of the Environmental Authorisation which the applicant must adhere to. The attention of the applicant is also drawn to the mitigation measures provided by the specialist assessments and the Aquaculture generic model by the DFFE Aquaculture Directorate to ensure financial sustainability of the project.

The project applicant, i.e. Greenies Farms, is being assisted under the DFFE Special Needs Programme on a pro bono basis as the applicant qualifies as having “special needs”, in particular, in that they do not have the financial means to conduct with BA process without financial support. In addition, the applicant has been included within the Operation Phakisa programme which further confirms sustainability. However, the applicant does not have financial resources to consider site alternatives as the process would require due to the land being tribal land.

Due to the site having low impacts following implementation of mitigation measures, it is therefore recommended by the EAPs that the proposed layout and preferred site (this proposal) be included in the Environmental Authorisation (should such authorisation be granted for the proposed project).



Provided that the specified mitigation measures outlined in the EMPr are applied effectively, it is the opinion of the EAP that the benefits of the project outweigh the negative impacts and the project should receive Environmental Authorisation in terms of the EIA Regulations 2014 promulgated under the NEMA.



12 DECLARATION BY EAP

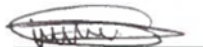
Declaration by Environmental Assessment Practitioner

I, VENESSA NKOSI (Name of person representing EAP) of INFORMATION DECISION SYSTEMS (name of company) declare that;

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 18 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- *will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and*
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 49B (2) of the Act.

1. Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- I have a vested interest in the proposed activity proceeding, such vested interest being:



Signature of the Environmental Assessment Practitioner

INFORMATION DECISION SYSTEMS (PTY) LTD

Name of company

2021/07/08

Date



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