

SCOPING REPORT FOR THE PROPOSED ESTABLISHMENT OF A 100MW
GAS PLANT ON PORTION A OF THE REMAINING EXTENT OF THE FARM
VETLAAGTE 4, EMTHANJENI LOCAL MUNICIPALITY, DE AAR, NORTHERN
CAPE PROVINCE

DRAFT SCOPING REPORT

REFERENCE NO

MARCH 2020

The logo for SATIVA features the word "SATIVA" in a bold, dark blue, sans-serif font. The letter "V" is stylized in green, with a leaf-like shape extending upwards from its top and another extending downwards from its bottom right. A horizontal line is positioned below the letters "S", "A", "T", and "I".

SATIVA

Travel and Environmental Consultants


Empowering sustainability through innovation

DOCUMENT SYNOPSIS

Item	Description
Proposed development and location	The proposed establishment of a 100MW Gas Plant on Portion A of the remaining extent of the Farm Vetlaagte 4, Emthanjeni Local Municipality, De Aar, Northern Cape Province.
Purpose of the study	Draft Scoping Report for the proposed establishment of a 100MW Gas Plant on Portion A of the remaining extent of the Farm Vetlaagte 4, Emthanjeni Local Municipality, De Aar, Northern Cape Province.
1:50 000 Topographic Map	Attached in Appendix A
Central Coordinates	30°39'00.97"S; 24°05'35.03"E
Municipalities	Emthanjeni Local Municipality
Predominant land use of surrounding area	Agricultural
Applicant	Greenleaf G5 (Pty) Ltd
Prepared for:	Greenleaf G5 (Pty) Ltd ETG House, 62 Wierda Road East Wierda Valley Sandton, 2196
Prepared by:	Sativa Travel and Environmental Consultants (Pty) Ltd Constantia Park, B16/5, 546, 16 th road, Midrand, 1685 Tel: 010 492 4330 Cell: 076 328 1558 Fax: 086 652 9774 E-mail: environment@sativatec.co.za
Authors	Moses Kgopana
Date of Report	04/03/2021

TITLE AND APPROVAL PAGE

Author:

Name	Title	Signature	Date
Moses Kgopana (Pri.Sci.Nat)	Environmental Assessment Practitioner (STEC)		04/03/2021

ACKNOWLEDGEMENTS

The authors acknowledge Greenleaf G5 (Pty) Ltd for their assistance with project information, layouts and the associated project background Information documents (BID) as well as responding to technical queries related to the project.

EAP UNDERTAKING

THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

I ...Moses Kgopana....., on behalf of Sativa Travel and Environmental Consultants, as the appointed independent environmental practitioner ("EAP") hereby declare that I:

- act/ed as the independent EAP in this application;
- regard the information contained in this report to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the application was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments;
- have ensured that the comments of all interested and affected parties were considered, recorded and submitted to the competent authority in respect of the application;
- have kept a register of all interested and affected parties that participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not; and
- am aware that a false declaration is an offence in terms of the EIA regulations.



Signature of the Environmental Assessment Practitioner:

Name of company: Sativa Travel and Environmental Consultants (Pty) Ltd

Date: 04/03/2021

EXECUTIVE SUMMARY

Sativa Travel and Environmental Consultants (Pty) Ltd (STEC) has been appointed by Greenleaf G5 (Pty) Ltd to undertake the EIA Processes in order to determine the biophysical, social and economic impacts associated with the installation of up to 100 MW Gas Plant on **Portion A** within the remaining extent of the Farm Vetlaagte 4 within Emthanjeni Local Municipality, Northern Cape Province.

The project will be located within the approved PV Facility, and the proposed project will have a footprint of <5ha. In terms of the National Environmental Management Act, 1998 (Act No.107 of 1998) as amended (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017) promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324, a full Scoping and Environmental Impact Assessment (EIA) Process is required for the proposed development. It is important to note that the proposed project will complement the currently approved PV Solar park and as such will utilize the associated infrastructure already approved as part of that application.

This document serves as the Draft Scoping Report for the establishment of the Gas Plant.

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TERMS AND DEFINITIONS

BA	Basic Assessment
BAR	Basic Assessment Report
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
CPV	Concentrated Photovoltaic
Ha	Hectare
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DWS	Department Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance & Sensitivity
ESA	Ecological Support Area
ESS	Environmental Scoping Study
I&AP's	Interested and Affected Parties
PDA	Primary Drainage Area
PV	Photovoltaic
QDA	Quaternary Drainage Area
PPP	Public Participation Process
SAHRA	South African Heritage Resource Agency
STEC	Sativa Travel and Environmental Consultants
TPV	Tracking Photovoltaic
WMA	Water Management Areas
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SWSA	Strategic Water areas of South Africa
WMA	Water Management Areas

STRUCTURE OF THE REPORT

The legislated content requirements for Scoping Report are contained in Appendix 2 of the Environmental Impact Assessment Regulations of 2014 as amended (GNR 326). For ease of reference, the table below cross references the content requirements and related section number in this report.

NO.	REQUIREMENTS	APPLICABLE SECTION IN THIS REPORT
A	details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures	Section 1.4
B (i)	The location of the activity, including the 21 digit Surveyor General code of each cadastral land parcel	Section 1.3 & Appendix A
(ii)	The physical address and farm name of the activity	
(iii)	The coordinates of the boundary of the property or properties	
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 on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
d	A description of the scope of the proposed activity, including a description of the activities to be undertaken and associated structures and infrastructure and including all listed and specified activities triggered and being applied for as well as the	Section 4
e	A description of the policy and legislative context within which the development is proposed including an identification and description of compliance to 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	Section 2
f	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	Section 4.11
g	A motivation for the preferred site, activity and technology alternative	Section 4.
H (i)	A full description of the process followed to reach the proposed preferred alternative within the site, including details of all the alternatives considered	Section 4.10

(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs	Section 3
(iii)	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	Section 3 of Final report
(iv)	The environmental attributes focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5
(v)	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 7
(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	Section 6
(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	Section 7
(viii)	The possible mitigation measures that could be applied and level of residual risk	Section 7
(xi)	A full description of the process followed to reach the proposed preferred alternative within the site, including if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such, as well as a concluding statement indicating the preferred alternatives, including preferred location of the activity	Section 4.10
I	A plan of study for undertaking the environmental impact assessment process to be undertaken, including:	Section 8
i.	A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity	
ii.	A description of the aspects to be assessed as part of the environmental impact assessment process;	Section
iii.	Aspects to be assessed by specialists;	Section 8
iv.	A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 6

v.	A description of the proposed method of assessing duration and significance;	
vi.	An indication of the stages at which the competent authority will be consulted	
vii.	Particulars of the public participation process that will be conducted during the environmental impact assessment process; and	Section 8
viii	A description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 8
ix	Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be monitored.	Section 7
J	An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in the reports, the inclusion of comments and inputs from stakeholders and I&APs, the inclusion of inputs and recommendations from the specialist reports where relevant and 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	Appendix C
K	Any specific information that may be required by the competent authority	None
L	Any other matters required in terms of section 24(4)(a) and (b) of the Act.	None

1 INTRODUCTION

A scoping process aims to determine the content and extent of the matters which should be covered in the Environmental Impact Assessment (EIA) and the information to be submitted to the competent authority for decision making. This report therefore identifies the key issues to be considered, sets out the appropriate time and space boundaries of the EIA study, and provides information necessary for decision-making by identifying the significant effects and factors to be studied in detail during the Environmental Impact Assessment Report (EIAR) phase of the process.

Sativa Travel and Environmental Consultants (Pty) Ltd (STEC) has been appointed by Greenleaf G5 (Pty) Ltd to undertake the EIA Processes in order to determine the biophysical, social and economic impacts associated with the installation of up to 100 MW Gas Plant on **Portion A** within the remaining extent of the Farm Vetlaagte 4 within Emthanjeni Local Municipality, Northern Cape Province.

In terms of the National Environmental Management Act, 1998 (Act No.107 of 1998) as amended (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017) promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324, a full Scoping and Environmental Impact Assessment (EIA) Process is required for the proposed development.

This document serves as the Draft Scoping Report for the establishment of the Gas Plant. The purpose of Scoping which constitutes the first phase of the overall Environmental Impact Assessment (EIA) process, includes the following amongst others:

- Assess the receiving environment in terms of current state and potential positive or negative impacts;
- Identify the legal framework in terms of the proposed project;
- Identify and engage with Interested and Affected Parties (IAPs) and allow for adequate participation in the process;
- Duly consider alternatives for achieving the project's objectives;
- Identify significant issues to be investigated further during the execution of the EIA phase;
- Determine the scope of the ensuing EIA phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- Allow for informed decision-making with regard to the EIA process.

Currently the site holds a positive Environmental authorization for the establishment of a Solar PV park. **Portion A** is authorized to generate up to 75 MW electricity from Solar PV panels / track PV (EA ref: 14/12/16/3/3/2/382/AM2) (see Table below and Appendix A for Locality Maps) with the current holder being Ennex Solar (Pty) Ltd.

The Applicant Greenleaf G5 (Pty) Ltd, wishes to establish a 100MW Gas Plant within the approved footprint of the Portion A PV Facility on the remaining extent of the Farm Vetlaagte 4.

Greenleaf G5 (Pty) Ltd, has an agreement in place with Ennex Solar (Pty) Ltd which allowed Greenleaf G5 (Pty) Ltd to submit the Portion A PV facility as part of the Department of Energy's (DoE) Risk Mitigated Independent Power Producer Procurement Programme (RMIPPPP). Greenleaf G5 (Pty) Ltd wishes to enhance and optimise the BID submitted with the addition of a 100 MW Gas park (as it will enhance the site's ability to be a hybrid electricity generating site). Should Greenleaf G5 (Pty) Ltd obtain preferred bidder status from the DoE, Ennex Solar (Pty) Ltd will transfer the Environmental Authorisations into the name of Greenleaf G5 (Pty) Ltd. This EIA to be undertaken for the establishment of the 100MW Gas Park, will consider all currently authorised and pending infrastructure as part of the cumulative impact assessment.

Table 1: Authorised PV Information

Portion	Lease Area (ha)	EA Area (ha)	MW	Technology	Project Company	DEA Ref
A	145.5	150	75	PV/TPV	Ennex Solar (Pty) Ltd	14/12/16/3/3/2/382/AM2

It is important to note that the proposed project will complement the currently approved PV Solar park and as such will utilize the associated infrastructure already approved as part of that application.

STEC' scope of work included undertaking a full Environmental Impact Assessment process which included a Public Participation Process (PPP) in terms of chapter 6, Regulation 41 of the EIA regulations of 2014 (as amended). The application was submitted to the competent authority on March 2021, namely the Department of Environment, Forestry and Fisheries (DEFF).

1.1 SITE LOCATION

The project is located on Portion A of the remaining extent of the Farm Vetlaagte 4, within Emthanjeni Local Municipality, Northern Cape Province. The site is approximately 6km east of the town of De Aar. The proposed project has a footprint of <5ha located within the approved Solar PV site. The study area is 17ha in extent to allow for the optimal location of the Gas Plant within the assessed area. Approximate center of the study site is 30°39'00.97"S; 24°05'35.03"E. Refer to **Figure 3** below as well as **Appendix A**.

1.2 PROPERTY DESCRIPTION

The properties that will be affected by the proposed project are reflected in Table 2 below.

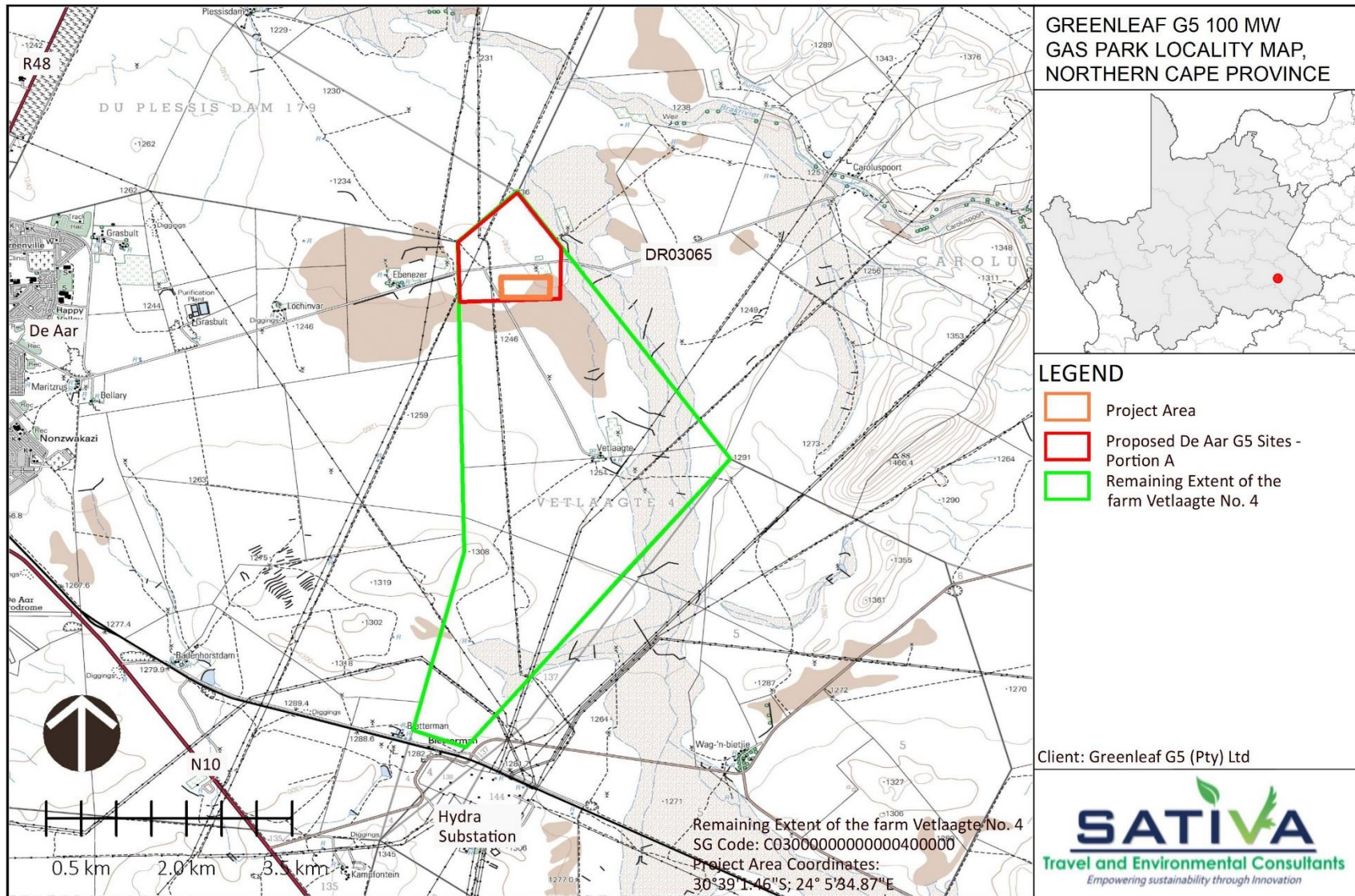
Table 2: Properties associated with the project

Property Name	Surveyor-General Cadastral Code No.	Footprint	Coordinates
Portion A of the remaining extent of the Farm Vetlaagte 4	C03000000000000400000	5 ha	30°39'00.97"S; 24°05'35.03"E

Table 3: Coordinates for the study area

Position	Coordinates
Corner 1	30°38'56.49"S ; 24° 5'46.36"E
Corner 2	30°39'5.85"S ; 24° 5'46.38"E
Corner 3	30°39'5.83"S ; 24° 5'23.60"E
Corner 4	30°38'56.54"S ; 24° 5'23.63"E

Photographs of the site and the surroundings are **attached as Appendix B** of this report. The photographs capture relevant features on site.



**GREENLEAF G5 100 MW
 GAS PARK LOCALITY MAP,
 NORTHERN CAPE PROVINCE**



LEGEND

- Project Area
- Proposed De Aar G5 Sites - Portion A
- Remaining Extent of the farm Vetlaagte No. 4

Client: Greenleaf G5 (Pty) Ltd



Figure 1: Locality Map

1.3 DETAILS OF THE ENVIRONMENTAL CONSULTING TEAM

Sativa Travel and Environmental Consultants (Pty) Ltd (STEC) is an independent environmental consultancy appointed by Greenleaf G5 (Pty) Ltd (the Applicant) to undertake the required EIA Process for the proposed project.

STEC does not have any financial or other interests in the undertaking of the proposed activity, other than remuneration for work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), the Environmental Impact Assessment Regulations, of 2014, as amended, and any specific environmental management Act; and does not have any vested interest in the proposed activity.

The contact details and experience of the Environmental Assessment Practitioner (EAP) undertaking the application are provided in **Table 3** below and proof of qualification is attached in **Appendix C**.

Table 4: EAP Details

Environmental Assessment Practitioner:	Sativa Travel and Environmental Consultants (Pty) Ltd
Contact Person:	Moses Kgopana (Pri.Sci.Nat) (Reg No. 115687) 
Address:	Address: Constantia Park, B16/5, 546, 16 th Road Midrand, 1685
Telephone	010 492 4330
Fax	086 652 9774
E-mail	environment@sativatec.co.za
Website	www.sativatec.co.za
Expertise	Moses Kgopana is an Environmental Manager with 13 years of experience and a BSc (hons) in Environmental Management. Mr Kgopana is a registered Professional Natural Scientist with the South

	<p>African Council for Natural Scientific Professions (SACNASP). Mr Kgopana has experience in various aspects of Environmental Management and this includes the following:</p> <ul style="list-style-type: none"> ❖ Undertaking and writing Environmental Impact Assessment; ❖ Writing Environmental Management Programmes; ❖ Undertaking and writing Waste Management Reports; ❖ Waste Management License; ❖ Sensitivity analysis, planning and Mapping; ❖ Conducting Public Participation Process; ❖ Conducting environmental awareness training; and ❖ Conducting legal compliance audits. ❖ Mining Right Applications ❖ Section 102 Applications ❖ Geotechnical Risk Assessments ❖ Dust and Water Monitoring ❖ Section 24G Applications ❖ Due Diligence reports
--	---

1.4 DETAILS OF APPLICANT/DEVELOPER

The contact details of the applicant are provided in Table 5 below.

Table 5: Details of Applicant

Name of Applicant:	Greenleaf G5 (Pty) Ltd
Contact Person	Parin Patel
Postal Address:	ETG House, 62 Wierda Road East Wierda Valley Sandton 2196
Physical Address:	ETG House, 62 Wierda Road East Wierda Valley Sandton 2196

1.5 OVERVIEW OF THE APPLICATION PROCESS

The environmental assessment process will be undertaken in two phases namely:

- **Environmental Scoping Process** which includes the notification of the process and commissioning of specialists' studies. This particular report details the outcome of this process; and
- **The Environmental Impact Assessment phase** resulting in the EIAR as well as an Environmental Management Programme (EMPr). The EMPr will be compiled based on the findings of the Environmental Impact Assessment and will provide mitigation and management measures for the planning and construction phase of the proposed project.

1.6 OBJECTIVES OF THE SCOPING PROCESS

The scoping process will, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site through a site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the site, including the nature, significance, consequences, extent, duration, and probability of the impacts; and
- Identify suitable measures to avoid, manage or mitigate impacts and to determine the extent of the residual risks that need to be managed and monitored.

1.7 ENVIRONMENTAL IMPACT ASSESSMENT REPORT PHASE

The EIAR will present findings of the EIA, describe the proposed activity and affected environment, forecast the significant impacts likely to result from the implementation of the activity; evaluate alternatives; and identify and evaluate the effectiveness of mitigation measures. An Environmental Management Programme will also be developed.

The draft EIAR will be made available to registered I&APs, including the competent authority to review and comment for a period of 30 days. Once the comments have been collated, responded to and integrated into the final EIAR the report will be submitted to DEFF for consideration and decision making

2 LEGISLATIONS AND GUIDELINES

All the applicable environmental standards contained within the environmental legislation will be adhered to. Below are applicable legislations and guidelines for the proposed development and have been identified as relevant:

2.1 THE CONSTITUTION OF SOUTH AFRICA, 1996 (ACT NO.108 OF 1996), AS AMENDED.

The Constitution of the Republic of South Africa¹ provides that, everyone has a right to an environment that is not harmful to their health or well-being. It further provides that, the environment should be protected for future generations through the implementation of the reasonable legislative and other measures that prevent pollution and ecological degradation.

In support of the above rights, the environmental management objectives of proposed project is to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the project site.

2.2 NATIONAL LEGISLATION AND REGULATIONS

2.2.1 National Environmental Management Act, 1998 (Act No.107 of 1998), as amended

The National Environmental Management Act aims to improve the quality of environmental decision-making by setting out principles for environmental management that apply to all government departments and organizations that may affect the environment. The Integrated Environmental Management (IEM) principles also aim to ensure that environmental impacts are considered before actions are taken or implemented and to ensure that there are adequate opportunities for public participation in decisions that may affect the environment. NEMA also creates a framework for facilitating the role of civil society in environmental governance.

Section 24(1) of the NEMA states:

- "In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization."

¹ The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996).
Section 24 – Bill of Rights

2.2.2 EIA Regulations

The NEMA EIA Regulations (2014) were promulgated and came into effect on 04 December 2014. The Amendments to the EIA Regulations, 2014, published in Government Notice R326 in Government Gazette No. 40772 came into effect on 7 April 2017. These Regulations 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, and for matters pertaining thereto.

2.2.3 LISTED ACTIVITIES

All the listed activities potentially forming part of this proposed development and therefore requiring Environmental Authorisation (EA) formed part of the Application Form for EA that was prepared and submitted to the DEFF. At the time of release of this Draft Scoping Report to Interested and Affected Parties (I&APs) for review, the letter of acknowledgement from the DEFF stipulating the EIA Reference Number for the proposed project was pending. The listed activities potentially triggered by the proposed project are indicated in Table 6.

Table 6: Listed Activities

LISTING NOTICE 1 (GNR 327)		
Activity Number	Activity Description	Specific Scope
Activity 24	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Eight meter wide access roads will be constructed as part of the internal road network.

LISTING NOTICE 2 (GNR 325)		
Activity Number	Activity Description	Specific Scope
Activity 2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.	The Gas Plant will have a total output of approximately 100MW of electricity.
Activity 4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Storage of up to 2800m ³ fuel (LPG /Diesel/ very low sulphur oil)
Activity 6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding — (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	The Gas Plant will make use of turbines or engines which will require an air emissions license in terms of NEM:AQA Act No. 39 of 2004.

2.2.4 National Environmental Management Biodiversity Act (Act No. 10 of 2004)

The National Environmental Management: Biodiversity Act (NEM:BA) makes provisions for achieving the objectives of the United Nation’s Convention on Biological Diversity, to which South Africa is a signatory. The Bill promotes management, conservation and sustainable use of indigenous biological resources, and provides for:

- the management and conservation of biological diversity;
- the use of indigenous biological resources in a sustainable manner; and
- the fair and equitable sharing of benefits arising from the commercialization through bio-prospecting of traditional uses and knowledge of generic resources.

The Bill gives effect to international agreements relating to biodiversity which are binding on the Republic and provides for co-operative governance in biodiversity management and conservation, and provides for a National Biodiversity Institute to assist in achieving the above objectives. The Act gives wide powers to the National Biodiversity Institute to inter alia protect flora and fauna in appropriate enclosures, the collection of information, undertaking and promotion of research on indigenous biodiversity and the sustainable use of indigenous biological resources, the prevention, control or eradication of listed invasive species, biodiversity planning and other functions. This act lists all critically endangered, vulnerable and protected species. The potential occurrence of any such species were investigated in the process.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes inter alia the loss of threatened or protected species. Biodiversity offsets are a means of compensating for the loss of biodiversity after all measures to avoid, reduce or remedy biodiversity loss have been taken, but residual impacts still remain and these are predicted to be medium to high. Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the land owner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

2.2.5 National Water Act, 1998 (Act No.36 of 1998)

In terms of chapter 3, water resources are to be protected, used, developed, conserved, managed and controlled. This Act recognizes that water is a scarce resource; it is a natural resource that belongs to all of South Africa's people. The National Department of Water and Sanitation is responsible for the nation's water resource and also the Minister of Department of Water and Sanitation ensures that the water resource is "protected, used, developed, conserved, managed and controlled" through the implementation of this Act (National Water Act 36 of 1998).

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface and ground water.

Section 21 of the Act lists the following water uses that need to be licensed:

- a) taking water from a water resource;
- b) storing water;
- c) impeding or diverting the flow of water in a watercourse;
- d) engaging in a stream flow reduction activity contemplated in section 36;

- e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) disposing of waste in a manner which may detrimentally impact on a water resource;
- h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- i) altering the bed, banks, course or characteristics of a watercourse;
- j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) using water for recreational purposes.

Any activities that take place within a water course or within 500 m of a wetland boundary require a Water Use Licence (WUL) under the Section 21 (c) and Section 21 (i) of the NWA. The need for a Water Use Licence will be determined in the EIA Phase.

2.2.6 National Environmental Management: Protected Area Act, 2003 (Act No.57 of 2003)

The aim of this Act is to provide for the protection and conservation of ecologically viable areas, which are representative of South Africa's Biodiversity, as well as natural landscapes and seascapes.

2.2.7 National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004)

The main objective of the National Environmental Management Air Quality Act (NEMAQA) is the protection of the environment and human health in a sustainable (economic, social and ecological) development framework, through reasonable measures of air pollution control. The proposed Gas Plant will require an Atmospheric Emissions Licence which will be applied for concurrently with the EIA process.

2.2.8 Occupational Health and Safety Act, 1993 (Act No.85 of 1993)

To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work.

It should be noted that in terms of the Major Hazardous Installation Regulations, 2001 (GNR 692) and Schedule A of the General Machinery Regulations GNR 1521 the proposed project does constitute a MHI facility and as such an MHI assessment will be undertaken as part of the EIA phase.

2.2.9 The Conservation of Agricultural Resources Act, 1983 (Act No.43 of 1983)

The Act focuses on soil conservation, control of the utilization and protection of wetlands, control and prevention of veld fires, control of weeds and invader plants. The act as amended in March 2001 set out the regulations regarding the control of weeds and invasive plants and provides a list of declared plants.

2.2.10 Hazardous Substance Act (No15 of 1973)

Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.

2.2.11 National Environmental Management: Waste Act, 2008 (Act No.59 of 2008) (NEM:WA)

The NEM:WA provides reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. One of its main objectives is to protect health, wellbeing and the environment by providing reasonable measures for securing ecologically sustainable development while promoting justifiable economic and social development.

2.2.12 National Heritage Resource Act (No 25 of 1999) and Regulations

No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site. No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. A grave is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

This EIA process also takes consideration the following legislation

- South African National Standard SANS 10103:2008 (The Measurement and Rating of Environmental Noise with Respect to Annoyance and Speech Communication).
- National Noise Control Regulations (1998).

2.3 REGIONAL PLANS

The following regional plans were or will be considered during the execution of the EIA (amongst others):

- The municipal Spatial Development Framework (SDF);
- The municipal Integrated Development Plan (IDP); and
- Other relevant national, provincial, district and local policies, strategies, plans and programmes.

3 SCOPING AND EIA PROCESS AND PUBLIC PARTICIPATION

The NEMA EIA Regulations (2014) were promulgated and came into effect on 04 December 2014. The Amendments to the EIA Regulations, 2014, published in Government Notice R326 in Government Gazette No. 40772 came into effect on 7 April 2017. These Regulations 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, and for matters pertaining thereto.

3.1 ENVIRONMENTAL ASSESSMENT TRIGGERS AND AUTHORITIES

Based on the types of activities or scope involved in this development, the requisite environmental assessment for the project is a Scoping and EIA process. Refer to **Chapter 2** for the project's legal framework and specifically the activities triggered by the project in terms of Listing Notices 2 of the EIA Regulations, 2014).

In terms of S24C of NEMA All the Utilities Infrastructure/Electricity /Generation/Non Renewable/Hydrocarbon – Petroleum development are adjudicated by the Department of Environment, Forestry and Fisheries. Due to the geographic location of the project the Department of Environment and Nature Conservation is regarded as one of the key commenting authorities in terms of NEMA during the execution of the EIA, and all documentation will thus be copied to this Department (amongst others). Various other authorities with jurisdiction over elements of the receiving environment or project activities will also be consulted during the course of the EIA. Refer to the database of Interested and Affected Parties (IAPs) contained in **Appendix D** for a list of the government departments that were notified during the EIA process to date.

3.1.1 LISTED ACTIVITIES

Table 7: Listed Activities

LISTING NOTICE 1 (GNR 327)		
Activity Number	Activity Description	Specific Scope
Activity 24	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or	Eight meter wide access roads will be constructed as part of the internal road network.

	<p>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</p> <p>but excluding a road—</p> <p>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;</p> <p>(b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.</p>	
LISTING NOTICE 2 (GNR 325)		
Activity Number	Activity Description	Specific Scope
Activity 2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.	The Gas Plant will have a total output of approximately 100MW of electricity.
Activity 4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Storage of up to 2800m ³ fuel (LPG /Diesel/ very low sulphur oil)
Activity 6	<p>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding —</p> <p>(i) activities which are identified and included in Listing Notice 1 of 2014;</p> <p>(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;</p> <p>(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or</p> <p>(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.</p>	The Gas Plant will make use of turbines or engines which will require an air emissions license in terms of NEM:AQA Act No. 39 of 2004.

3.2 PURPOSE OF EIA

The purpose of an Environmental Impact Assessment (EIA) is to provide decision-makers (Government Authorities) with adequate and appropriate information about the potential positive and negative impacts of a proposed development and associated management actions in order to make an informed decision whether or not to approve the development.

For the EIA processes to retain their role and usefulness in supporting decision-making, the involvement of specialists in EIA needs to be improved in order to:

- Add greater value to project planning and design;
- Adequately evaluate reasonable alternatives;
- Accurately predict and assess potential project benefits and negative impacts;
- Provide practical recommendations for avoiding or adequately managing negative impacts and enhancing benefits;
- Supply enough relevant information at the most appropriate stage of the EIA process to address adequately the key issues and concerns, and effectively inform decision-making in support of sustainable development.

3.3 SCOPING AND ENVIRONMENTAL IMPACT REPORTING

All the listed activity identified follow S&EIA in accordance to EIA Regulations, 2014 as amended. The approach therefore entails five (5) distinctive phases:

- Phase 1: Consultation, Application and Scoping Report
- Phase 2: Specialist Studies
- Phase 3: Environmental Impact Assessment
- Phase 4: Public Participation Process (PPP).
- Phase 5: Environmental Authorization

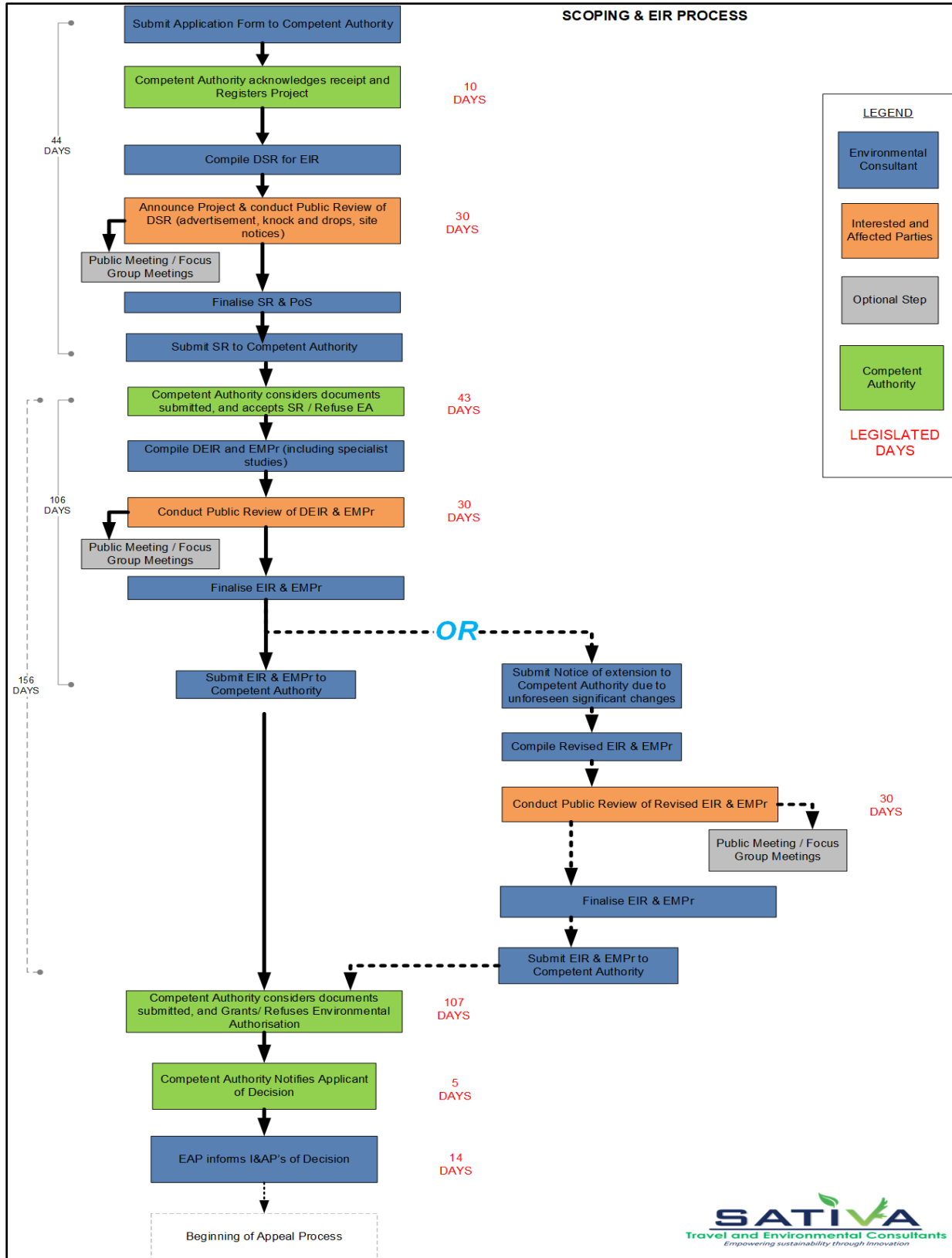


Figure 2: EIA process flow

3.3.1 SCOPING PROCESS

The purpose of Scoping, which constitutes the first phase of the formal EIA process, is as follows:

- Identify the legal framework in terms of the proposed project;
- Identify and engage with IAPs and allow for adequate participation in the process;
- Duly consider alternatives for achieving the project's objectives;
- Identify significant issues to be investigated further during the execution of the EIA phase;
- Clarify the roles and responsibilities of various stakeholders in the process;
- Determine the scope of the ensuing EIA phase, in terms of specialist studies, public participation, assessment of impacts and appraisal of alternatives; and
- Allow for informed decision-making by DEFF and other authorities with regard to the EIA process.

3.3.2 IDENTIFICATION OF INTERESTED AND AFFECTED PARTIES AND DATABASE MANAGEMENT

I&APs representing the following sectors of society have been identified (see **Appendix** of the preliminary I&AP database):

- a. National and Provincial Government Representatives:
 - Department of Environmental, Forestry and Fisheries (DEFF);
 - Department of Water & Sanitation (DWS);
 - Department of Agriculture;
 - Department of Trade and Industry (DTI);
 - Department of Energy (DoE);
 - National Environmental Standards and Regulations Enforcement Agency (NESRA);
 - South African Heritage Resources Agency (SAHRA); and
 - Relevant Northern Cape Provincial Authorities (ex. Environment & Conservation, Agriculture).
- b. Relevant Local and District Municipalities:
 - Pixley ka Seme District Municipality; and
 - Emthanjeni Local Municipality.
- c. State-owned Entities (SoE) – Eskom;
- d. Affected and surrounding landowners;
- e. Environmental Non-Governmental Organizations; and
- f. Community based organisations.

3.3.3 LANDOWNER CONSENT

According to Regulation 39(1) of GN No. 326 (7 April 2017), if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. The entire project site belongs to a private farmer and the proof of landowner consent is attached in **Appendix D**.

3.3.4 ADVERTISEMENT OF THE SCOPING PROCESS

In order to notify and inform the public of the proposed project and invite I&APs to register on the project database, the project and EIA Process will be advertised in the De Aar Echo and the Noordkaap bulletin for both English and Afrikaans concurrently with the release of this Draft Scoping Report. Copies of the advertisements placed will be contained in **Appendix D** of the Draft Scoping Report.

Regulation 41 (2) (a) of the 2014 EIA Regulations require that a notice board providing information on the project and EIA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. A copy of the notice boards and proof of placement thereof will be included in the Final Scoping Report

The participation of all Interested and Affected Parties (I&APs) has become a fundamental principle of numerous pieces of legislation, including the NEMA, all of which are relevant to the proposed project. The primary aims of the public participation process during the Environmental Scoping Study are:

- To inform Interested and Affected Parties (I&APs) of the proposed project;
- To identify issues, comments and concerns as raised by I&APs;
- To promote transparency and an understanding of the project and its consequences;
- To serve as a structure for liaison and communication with I&APs; and
- To provide local knowledge and input in identifying potential environmental (biophysical and social) impacts and “hotspots” associated with the proposed development.

Individuals as well as organisations must have an opportunity to contribute / comment on the project. The following sectors of stakeholders are examples of who may be included in a stakeholder database register:

- National, provincial and relevant local authorities.
- Environmental and conservation NGOs.
- Legal NGOs.
- Commercial concerns and associations.
- Stakeholder representatives, development bodies in the immediate vicinity.
- Local groupings in the vicinity.

3.3.5 PUBLIC ANNOUNCEMENT OF THE PROJECT

In compliance with the EIA Regulations (2014), notification of the commencement of the ESS process was undertaken by means of the following (see **Appendix D** for public announcement documentation):

- Publication of media advertisement in the **De Aar Echo on 12 March 2021 and the Noordkaap Bulletin on 11 March 2021**.
- On-site notices placed from **beginning March 2021**, detailing the proposed development, the BA process and an invitation to register and comment. Notices were placed at strategic places on site and in the vicinity of the site (along the road, at intersections, etc.) as well as at high frequented places within the town of De Aar; and
- Distribution of letters by email and post to I&APs and telephonic calls.

3.3.6 SCOPING REPORT PUBLIC REVIEW

A period of 30 calendar days will be allowed for public comment. The availability of the Draft Reports will be announced by way of:

- All initial contact with I&APs;
- Personalised letters to all I&APs on the database;
- Posters at selected public places to announce the opportunity to comment; and
- The printed media (where necessary).

The reports will be distributed for comment as follows:

- Public places such as libraries, municipal offices and community centres throughout the study area where the broader public can have access to it (where applicable);
- CD copy available on request by key stakeholders; and
- Available on the STEC website.

A key assumption in the formulation of this approach is that STEC has access to the previous public participation database used in the previous EIA process.

3.3.7 SUBMISSION OF SCOPING REPORT TO DEFF FOR DECISION

After the 30 days review period an updated Scoping Report, reflecting all the comments received, will be submitted to the DEFF for decision-making in line with Regulation 22 of the 2014 EIA Regulations, as amended. In line with best practice, I&APs on the project database will be notified of the submission of the Scoping Report to the DEFF for decision-making.

The Final Scoping Report that is submitted for decision-making will also include proof of the PPP that was undertaken to inform organs of state and I&APs of the availability of the Draft Scoping Report for the 30 day review (Section 3.3.6). It will also include proof of the newspaper advertisements placed, site notices places and all other communications with I&Aps (See **Appendix D** for PP documents).

The DEFF will have 43 days (from receipt of the Final Scoping Report) to either accept the Scoping Reports with or without conditions, or refuse the report. This step marks the end of the PPP for the Scoping Phase. The PPP for the subsequent EIA Phase is presented in the Plan of Study for EIA (Section 8).

3.4 SCHEDULE FOR THE EIA

The proposed schedule for the EIA, based on the legislated EIA Process, is presented in **Appendix E** of this report. The schedule highlights actions going forward for the proposed Gas Plant project. It should be noted that this schedule could be revised during the EIA Process, depending on factors such as time required by the authorities to make an informed decision. Furthermore, the schedule assumes that preferred bidder status will be received from the DoE for the RMIPPPP and as such this project will be regarded a Strategic Infrastructure Project (SIP).

4 PROJECT DESCRIPTION

4.1 PROJECT DESCRIPTION

The proposed project involves the establishment of a 100 MW Gas Plant located within Portion A of the remaining extent of the Farm Vetlaagte 4, within Emthanjeni Local Municipality, De Aar, Northern Cape Province. Portion A is currently authorised for the establishment of a 75 MW Solar PV facility. The Gas Plant will be located within the currently approved PV facility footprint, and will complement the site by way of allowing it to be a hybrid electricity generating site as favored by the DoE within the RMIPPPP.

The Applicant has not made a selection on the type of technology that will be used to generate the 100MW of electricity as a vendor has not been selected as yet (due to various factors such as local economic development parameters set out by the DoE, etc.). Therefore this EIA will assess both potential technologies (Engines and Turbines) as the preferred technology. In addition the Turbines / Engines will be fueled by either LPG gas, diesel or very low Sulphur oil (or a combination of it). As such this assessment will consider all the potential impacts from the potential fuel sources as the preferred alternative.

Section 4.10 below provides more details on the technology alternatives and design alternatives that will be assessed within the EIA phase of the project.

4.2 SITE LOCATION

The project is located on Portion A of the remaining extent of the Farm Vetlaagte 4, within Emthanjeni Local Municipality, Northern Cape Province. The site is approximately 6km east of the town of De Aar. The proposed project has a footprint of <5ha located within the approved Solar PV site. Approximate center of the study area is 30°39' 00.97"S; 24°05' 35.03"E. Refer to **Figure 3** below as well as **Appendix A**.

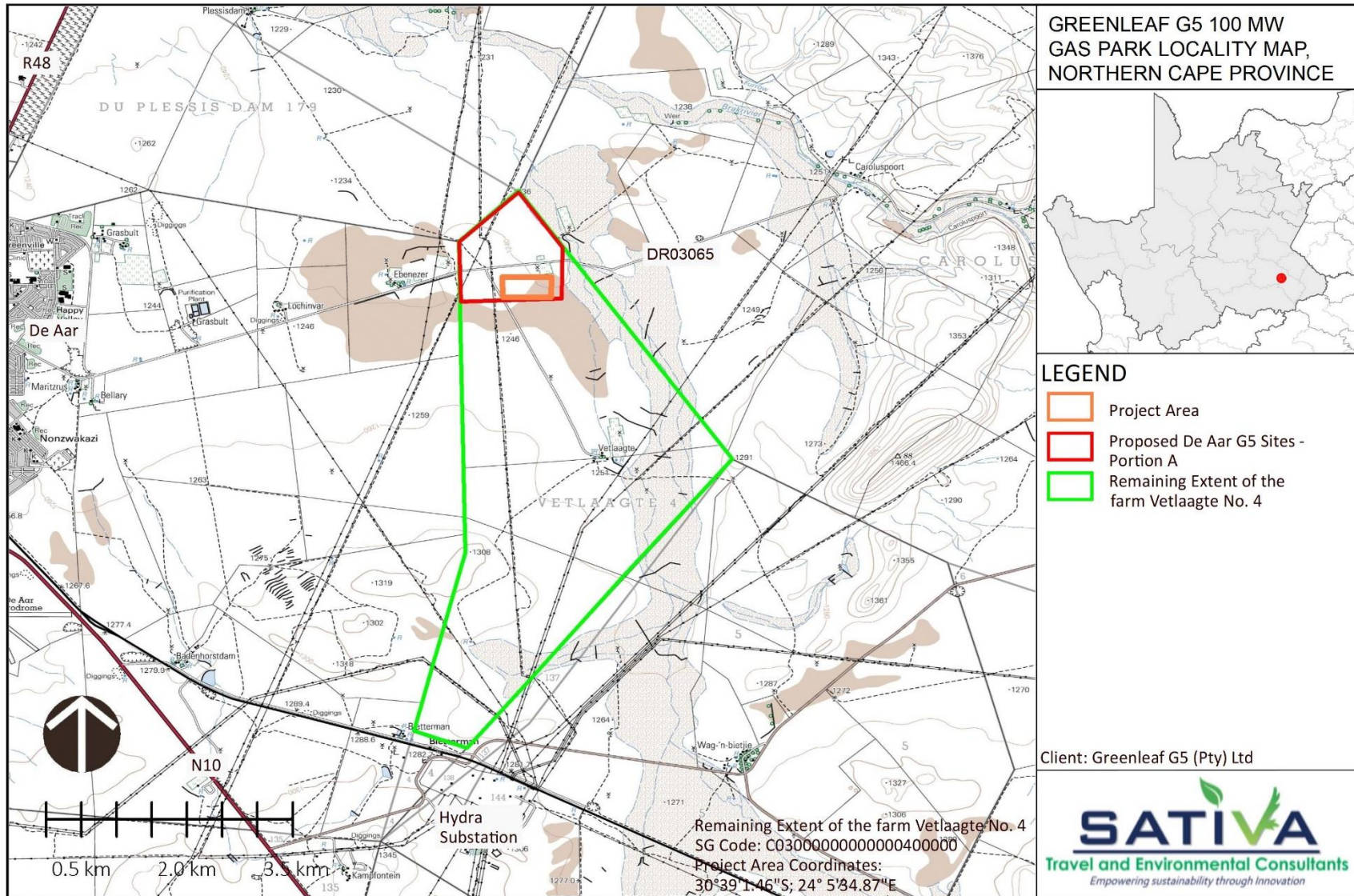


Figure 3: Locality Map for the proposed development

4.3 SITE ACCESS

The site will be accessed from the town of De Aar via the R48 and the Caroluspoort road. Within the site itself, internal access roads will be constructed as per the approved Solar PV plant to facilitate the movement of delivery vehicles, trucks and private vehicles.

4.4 CURRENT STATUS QUO OF THE SITE

The site is currently used for livestock grazing (sheep, cattle, and game species). The site is currently approved for the construction of a Solar PV plant.

4.5 WATER & ELECTRICITY DEMAND AND SUPPLY

Water will be supplied from the Local Municipality during the construction and operational phases. As per the previous EIA report, electricity for the construction phase will be supplied by Eskom.

4.6 EMPLOYMENT OPPORTUNITIES

The proposed development is to complement the approved Solar PV park, and as such the construction force that will be deployed to construct the PV will also construct the Gas Plant.

4.7 WASTE AND RECYCLING

The EMP which will form part of the Environmental Impact Assessment (EIA) Report will address waste management practices to be implemented. During the design phase of the project, targets will be set for the re-use of construction waste materials thereby limiting waste sent to landfill (i.e. goal would be zero waste to landfill during construction and operational phases)

4.8 STORMWATER MANAGEMENT

- No hardened channels for stormwater management.
- Enhance stormwater systems so that they become an amenity and promote biodiversity and open space for people to enjoy.

4.9 PROJECT DEVELOPMENT CYCLE

4.9.1 CONSTRUCTION

The construction phase will take place subsequent to the issuing of an Environmental Authorisation (EA). The construction phase for the proposed project is expected to extend over a period of between 12 - 18 months, assuming normal daylight working hours are in place.

The construction phase will involve the transportation of personnel, construction material and equipment to the site, and personnel away from the site. Most of the technology to be used will come in mobile containers from the manufacturers. In terms of site establishment, laydown areas will be required at the outset of the construction phase, as well as dedicated access routes from the laydown areas to the working areas. Haul roads for construction traffic (for the delivery of concrete, road materials and other construction materials) will be required.

The laydown area will either be located adjacent to or at the project site. It is expected that the laydown area will be temporary in nature (for the duration of the construction phase) and will include the establishment of the construction site camp (including site offices and other temporary facilities for the appointed Contractors). The laydown area is expected to cover an area less than 1 ha (depending on the contracting strategy at the time). If the laydown area is located outside of the footprint of the facility itself, the area will thereafter be rehabilitated (i.e. returned to its pre-construction condition) at the end of the construction phase.

All efforts will be made to ensure that all construction work will be undertaken in compliance with local, provincial and national legislation, local and international best practice, as well as the Environmental Management Programme (EMPr), which will be compiled during the EIA Phase and included in the EIA Report. During the construction phase, both skilled and unskilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage.

4.9.2 Operation and Maintenance

The anticipated date of the start of operations of the proposed project is dependent on several external factors such as being selected by the DoE as a preferred bidder. The following activities will occur during the operational phase:

- Generation of electricity f

The projected operations are expected to provide fewer services especially in maintenance of the plant. The operational phase of the project is expected to create limited skilled employment opportunities.

4.9.3 Decommissioning

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e. if the facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the site will be rehabilitated and returned to its pre-construction state.

4.10 ASSESSMENT OF ALTERNATIVES

The assessment of alternatives is an objective of the EIA Regulations of 2014 as amended. The Integrated Environmental Management (IEM) procedure requires that an environmental investigation needs to

consider feasible alternatives for any proposed development. Therefore, the Department of Environment, Forestry and Fisheries (DEFF) requires that a number of possible proposals or alternatives for accomplishing the same objectives should be considered. To ensure that the proposed development enables sustainable development, feasible alternatives must be explored.

In the case of the proposed development, possible alternatives were identified through discussions with the project team, reviewing of existing environmental data, and specialist inputs/studies.

In terms of the NEMA Regulations, 2014 (as amended), the definition of alternatives is given as:

'Alternatives' in relation to a proposed activity, means different means of meeting the general purpose and requirement of the activity, which may include alternatives to the –

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

Alternatives for the development were considered as follows:

4.10.1 LOCATION ALTERNATIVES

The proposed project is to optimize the BID submitted to the DoE as part of the RMIPPPP, and as such an alternative site is not feasible. However the EIA will assess an area much larger than the proposed footprint of the proposed project to allow for micro-sitting as needed.

4.10.2 ACTIVITY ALTERNATIVES

The proposed activity is to create a hybrid electricity generating facility to meet the requirements of the RMIPPPP. Therefore no activity alternatives have been considered for this application

4.10.3 DESIGN OR LAYOUT ALTERNATIVES

The proposed project is to optimize the BID submitted to the DoE as part of the RMIPPPP, and as such an alternative site is not feasible. However the EIA will assess an area much larger than the proposed footprint of the proposed project to allow for micro-sitting as needed. The design of the project can only be finalized once preferred bidder status is issued and a vendor has been selected according to the DoE's criteria on local economic development content. A conceptual layout of the Gas engine / turbine plant is provided below:

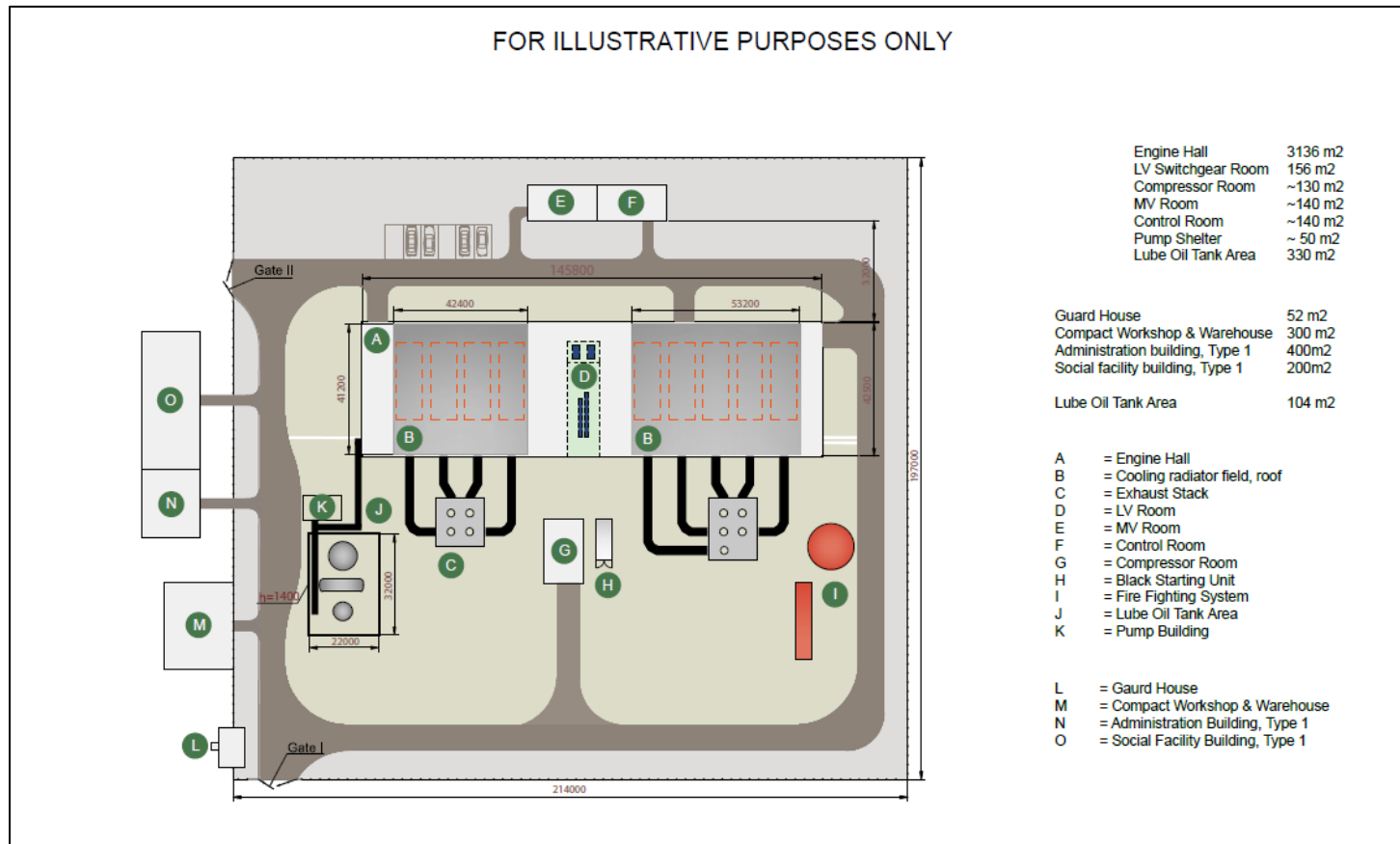


Figure 4: Conceptual layout

4.10.4 TECHNOLOGY ALTERNATIVES

It is anticipated that the Gas Turbines / Engines will run for approximately 8 - 12 hours per day, and will supply electricity into the grid during low Solar periods (to compliment the approved Solar PV Park). It should be noted that the Gas Turbines will be air cooled and will not require water for cooling purposes, and the Engines may require water for cooling depending on which vendor is selected. This will be further assessed within the EIA phase of the project.

Below are examples of Turbines and Engines that are currently being considered for the proposed project:

Engines:

Jenbacher J920

The Jenbacher J920 engine has an output of approximately 10MW electrical with high efficiency levels of up to 49%. The engine provides a stable output with reliable efficiency in any ambient conditions. The fast and easy installation coupled with simple maintenance makes this a desirable engine choice (<https://www.clarke-energy.com/gas-engines/type-9-gas-engine/>).

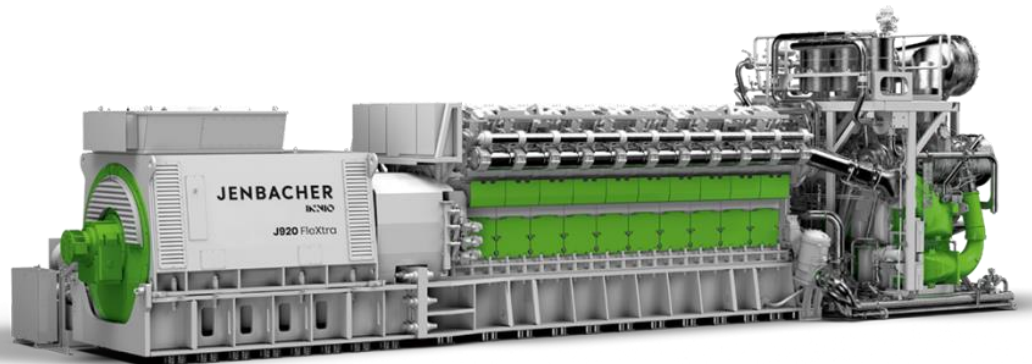


Figure 5: Jenbacher J920 Engine

Wartsila W 20V34SG

The Wärtsilä 34SG is a four-stroke, spark-ignited, lean-burn gas engine generating set. Its agility and flexibility, plus the high efficiency delivered over the entire load range and in any operating profile, makes the Wärtsilä 34SG generating set an excellent choice for both flexible baseload and peak load, and for supporting the grid with variety of ancillary services. It also offers unique fast-starting capability, which enables rapid response to fluctuations inherent to renewable generation. The 20V engine provides for an

electrical output of approximately 10MW. The genset is easily transported as one piece already assembled. The dimensions of the engine are: Length (13m) x width (3.3m) x height (4.5m) (https://www.wartsila.com/docs/default-source/power-plants-documents/downloads/product-leaflets/w34sg_leaflet.pdf).



Figure 6: Wartsila W 20V 34SG engine

Turbines:

GE Power: TM2500

The TM2500 turbine has an electrical output of up to 36 MW with an efficiency of up to 37%. The turbine can be installed within 11 days depending on logistics. The TM2500 is a proven solution for providing a baseload bridge to permanent power installations or for generating backup power in the wake of natural disasters, plant shutdowns, grid instability or isolated locations (<https://www.ge.com/power/gas/gas-turbines/tm2500>).



Figure 7: GE TM2500 turbine

Solar Turbines: Titan 130

The Solar Turbines Titan 130 turbine has an electrical output of up to 16 MW with a high efficiency. The Turbine is designed for long-life industrial applications with a proven track record of over 20 years. The dimensions of the turbine: length (19m) x width (6m) x height (4m) which includes space for maintenance. (https://www.solarturbines.com/en_US/products/power-generation-packages/titan-130.html).

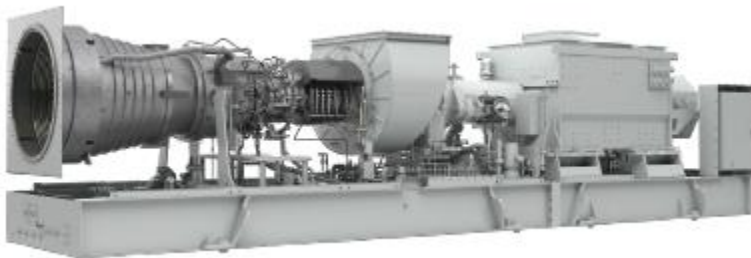


Figure 8: Solar Turbine Titan 130

ALTERNATIVES THAT ARE CONSIDERED:

An Alternative that will be assessed in the EIA phase is that of a Conventional Boiler with a steam turbine when compared to the Engines / Turbines.

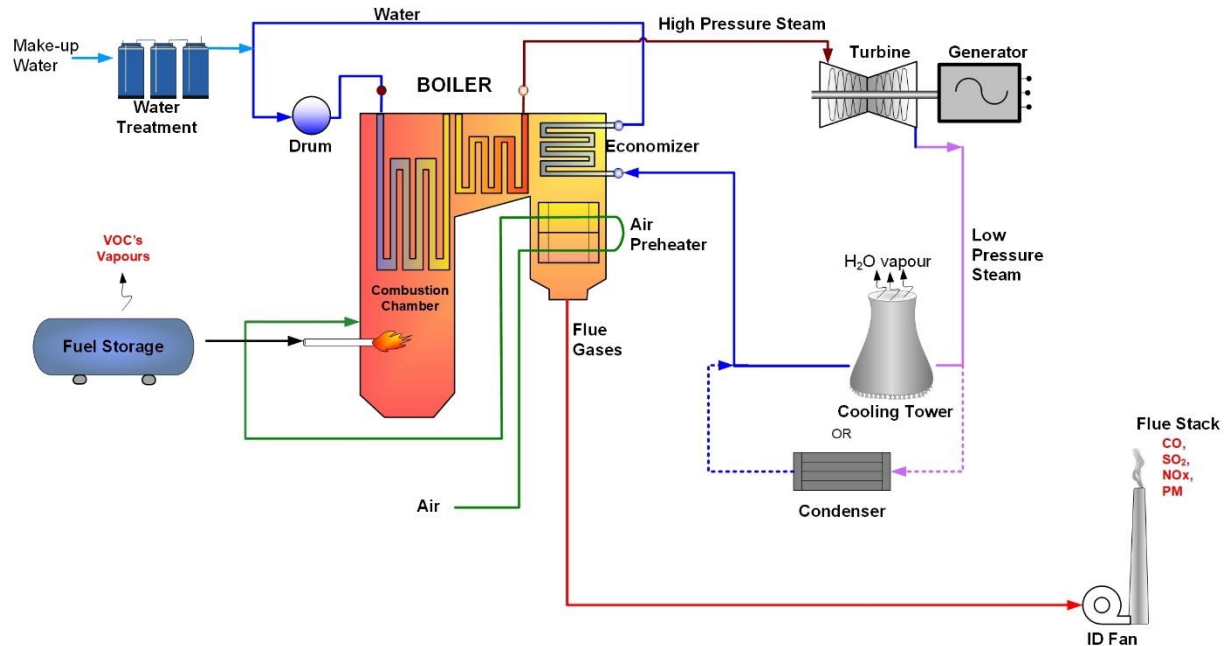


Figure 9: Typical Boiler illustration

The storage of fuel has two options that have been considered for this project. The fuel can be stored in the typical “bullets” or in that of a sphere, as shown below. The Sphere storage tanks:

- Allow for the optimisation of space as it has a smaller footprint;
- Are more expensive than its counter part;
- Have a greater height than that of the bullet tanks (thus resulting in a much higher visual impact);
- Are more difficult to decommission;
- Have a higher degree of risk and downtime due to the difficulty in maintenance;
- Take longer to construct than the bullet storage tanks;
- Require some cooling mechanism to keep gas temperatures lower within the tanks.

The bullet storage tanks can be designed and built to specification as required by the plant. It is envisaged that four (4) bullet storage tanks will be constructed holding up to 700 m³ of fuel each (totaling 2800m³ of fuel). This will allow for continuous operation of the plant while ensuring maintenance is completed. For the reasons mentioned above it is not feasible to utilise the sphere storage tanks on the proposed sites, and as such it will no longer be considered as an alternative and taken forward into the EIA phase of the project.



Figure 10: Typical Bullet set up



Figure 11: Sphere storage tanks

4.10.5 OPERATIONAL ALTERNATIVES

There are no operational alternatives applicable to this project.

4.10.6 NO-GO ALTERNATIVE

The no-go option entails that the development site stays in the current state. If the proposed development would not continue and the no-go option is pursued it will imply that the already approved Solar PV Park will be the only electricity generating facility that would be constructed. This however will not meet the requirements of the RMIPPPP process and as such the applicant is unlikely to get preferred bidder status. This implies that the electricity shortfall and the requirements of the IRP 2019 will not be fulfilled. In this instance, it is not recommended that the No-Go option be followed

4.11 NEED AND DESIRABILITY

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. The critical aim of investigating the need and desirability of a proposed project revolves around determining suitability (i.e. is the activity proposed in the right location for the suggested land-use/activity) and timing (i.e. is it the right time to develop a given activity?).

As South Africa's population and economy continue to grow, so does the electricity demand and the strain it places on natural resources. Renewable energy is the fastest-growing electricity source, displacing fossil fuel-electricity which ensures the transition towards more sustainable electricity production. Though solar energy offers low-carbon electricity generation, its utilisation is characterised by two major constraints.

The first constraint is that solar PV is an intermittent electricity-generating resource. This means that solar electricity production is not continuous and is not always available for meeting electricity demand on the grid. Solar electricity generation varies geographically and temporally (by hour, day, and season) with changes in solar irradiance and cloud cover. Not only is solar generation variable, but it is also consistently unavailable in the early mornings and evenings before the sun has risen or after the sun has set. This daily decline in solar electricity production happens to coincide with the daily increase in electricity demand every morning and evening as thousands of electricity customers are home and use their electrical appliances (peak demand). To meet this daily peak demand, South Africa relies on coal-fired power plants, which can quickly dispatch electricity to the grid. The second constraint on solar electricity is the potential for solar power plants to produce more electricity during the day than is needed by customers, causing potential damage to the grid. Given the inflexibility of the grid, Grid operators must always maintain an exact balance between electricity generation and electricity demand on the grid. Thus, challenges with solar intermittency and over-generation may cause serious issues in maintaining the integrity and reliability of the grid.

Furthermore, the establishment of Gas Turbines/ Engines in conjunction with a Solar PV facility will create a hybrid electricity generation facility. This Hybrid power generation facility will have a higher dispatchability and allow for the generation of electricity for more hours of the day, as is desired in The Risk Mitigated Independent Power Producer Procurement Programme (RMIPPPP) currently underway by the Department of Mineral Resources and Energy (DMRE) (which was BID for by the Applicant).

The project will add new generation capacity under the Risk Mitigation Independent Power Producer Procurement Program (RMIPPPP). The IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW between 2019 and 2022. The objective of the RMIPPPP is to fill the current short-term supply gap, alleviate the current electricity supply constraints. One of the DMRE's conditions to tender the project under the RMIPPPP is that all projects must be able to operate between 5h00 and 21h30 in order to supply the grid during peak hours early in the morning and late afternoon when the sun has set, which can be done by using Gas Turbines / Engines.

Table 8 includes a list of questions to determine the need and desirability of the proposed project.

Table 8: Determination of the Need and Desirability of the development

No.	Question	Response
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	The proposed project will be located with an already approved site for a PV facility.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	The Town of De Aar, is already established and the proposed site is located within a private farm.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	The site is already approved for the establishment of a Solar PV facility for electricity generation purposes as required by the IRP of 2019.
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	Yes

5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)	The proposed project is located on an already approved PV facility.
6.	Is this project part of a national programme to address an issue of national concern or importance?	Yes, IRP 2019
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	The proposed project will compliment the already approved PV facility to allow the site to be a hybrid electricity generating site.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?	No
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	No
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	Yes, The proposed project is located on an already approved PV facility.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)	The proposed project is located on an already approved PV facility. The EIA phase of the project will identify and assess potential impacts of the project.
12.	How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	The proposed project is located on an already approved PV facility. The EIA phase of the project will identify and assess potential impacts of the project.
13.	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	No

14.	Will the proposed land use result in unacceptable cumulative impacts?	The proposed project is located on an already approved PV facility. The EIA phase of the project will identify and assess potential impacts of the project.
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4.12 ASSUMPTIONS

This Scoping exercise is followed by the assumptions and limitations of the development:

- In accordance with the purpose of Scoping, the report does not include detailed specialist investigations on the receiving environment, which will only form part of the EIA phase. The environment in the project area was primarily assessed in the Scoping phase through site visits and appraisals, desktop screening, incorporating existing information from previous studies, and input received from authorities and IAPs. A refinement of all maps will also be undertaken in the EIA phase, if necessary.
- All information contained within this report was true and relevant at the time of compilation of the report.

5 RECEIVING ENVIRONMENT

This chapter of the Scoping Report provides an overview of the affected environment for the proposed Gas Engines project and the surrounding region. The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development. This information is provided to identify the potential issues and impacts of the proposed project on the environment. The information presented here has been sourced from:

- Scoping input from the commissioned specialists that form part of the project team;
- Review of information available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and
- Basic Assessment & correlating specialist studies, as well as the full Scoping & EIA conducted on the same site in 2020 and 2012 respectively.

It is important to note that this chapter intends to provide an overview and does not represent a detailed environmental study. Detailed studies focused on significant environmental aspects of this project will be provided during the EIA Phase.

5.1 CLIMATE AND RAINFALL

The study area is situated in a drier rainfall region (201+ mm to 400 mm) of South Africa and within the Cold Interior Climate Zone. Refer to Figure 12 and Figure 13. The average annual rainfall for De Aar is approximately 297 mm (en.climate-data.org).

Rainfall in the regions peaks in early autumn (March). The mean annual precipitation (MAP) across the region ranges from about 190 mm in the west to 400 mm in the northeast. Mean maximum and minimum monthly temperatures for Britstown are 37,9°C and -3,6°C for January and July, respectively. Corresponding values are 37,1°C and -4,8°C for De Aar and 39,0°C and -2,3°C for Kareekloof (northwest of Strydenburg) (Mucina & Rutherford, 2006).

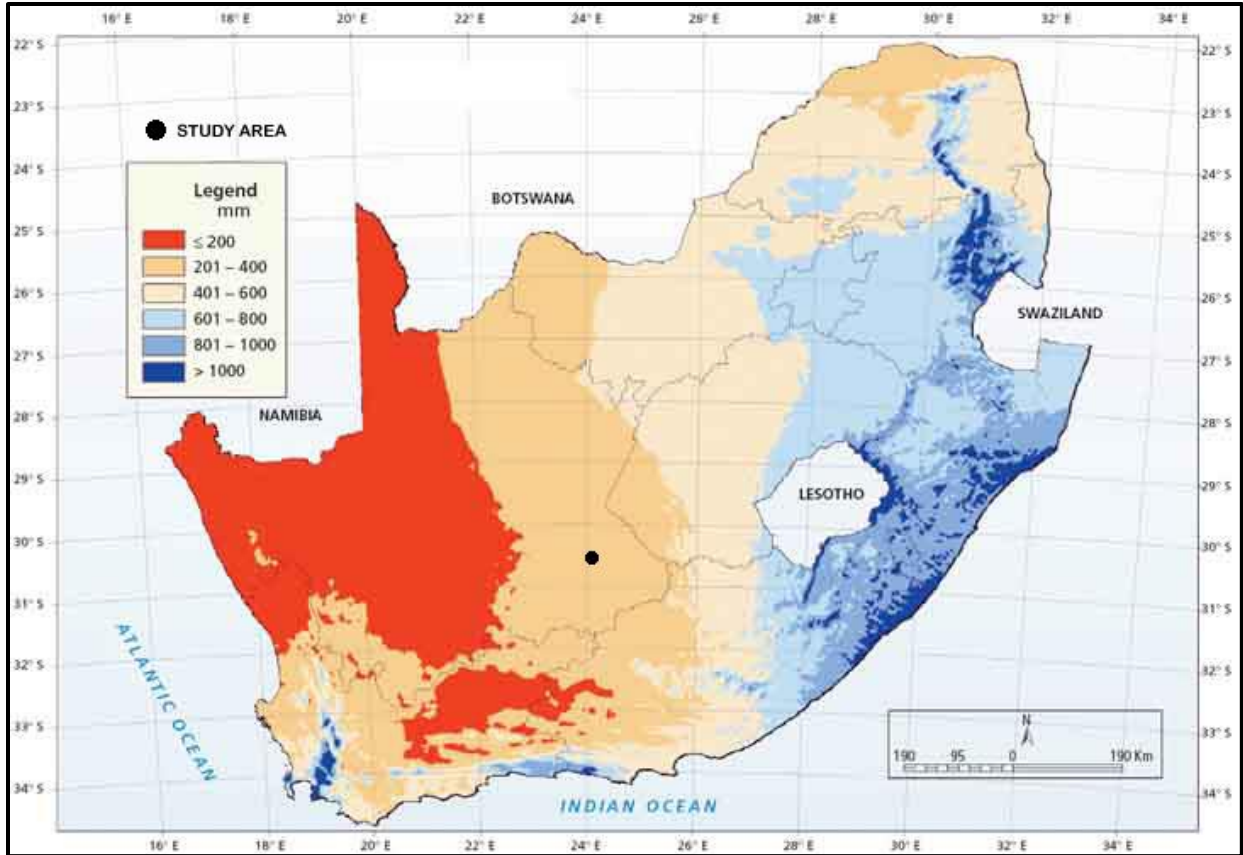


Figure 12: Rainfall zones of South Africa

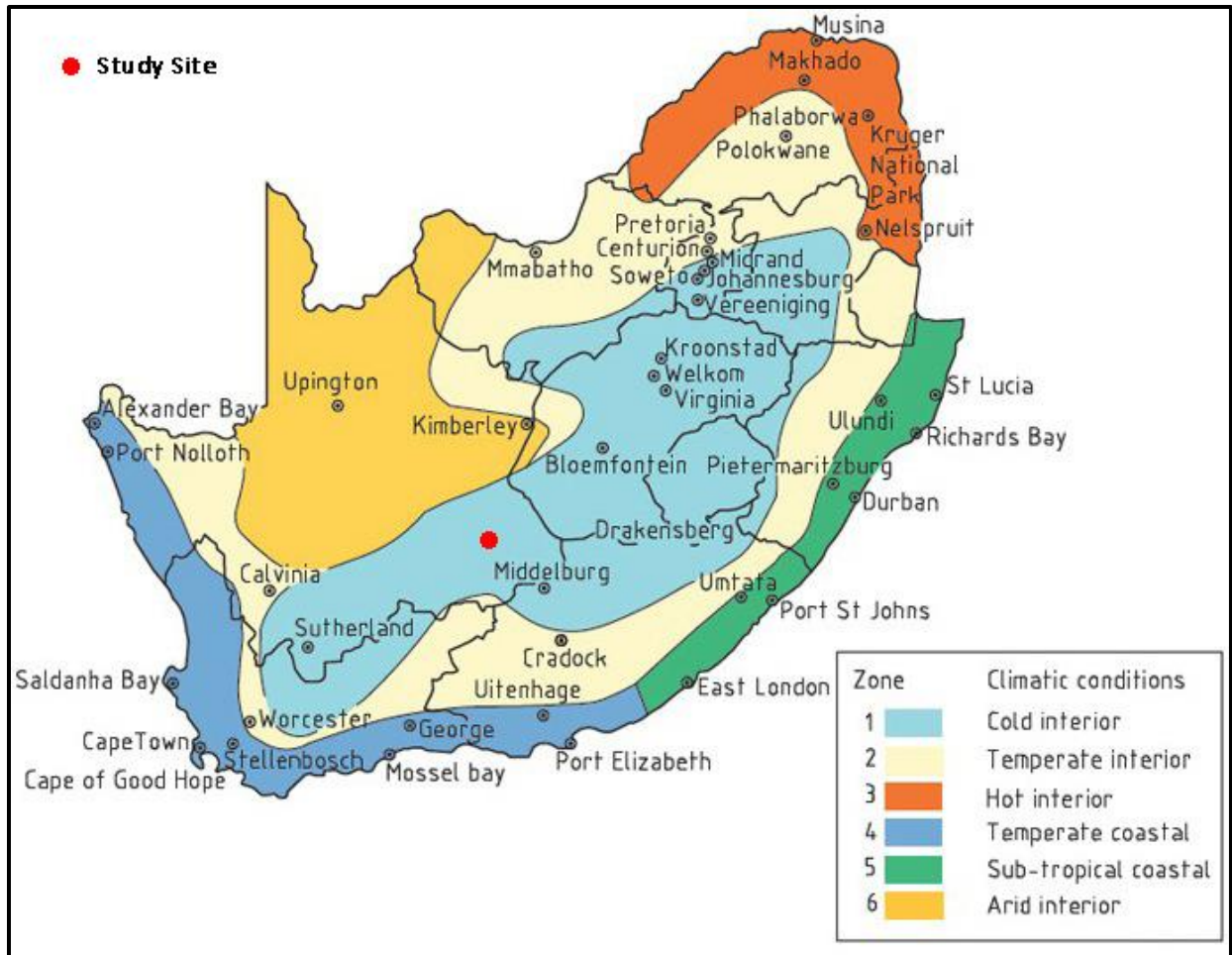


Figure 13: Climatic zones of South Africa

5.2 TOPOGRAPHY

The topography of the study area is that of flat to gently undulating plains, with isolated hills, mountains and inselbergs. Many of these mountains have flat, plateaus. Broad but shallow valleys or ancient watercourses and drainage lines are spread throughout the area, in which highly seasonal and ephemeral streams flow. The study site is situated on flat to gently undulating plains with a broad shallow valley / ancient floodplain along the eastern boundaries. The average height above sea level (asl) across the remaining extent of the farm Vetlaagte 4 is from 1 246 m to 1 285 m with a downward slope from south to north and west to east, with an average slope of 1,2%.

5.3 GEOLOGY AND SOILS

The Geology of the site is that of Shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both of the Ecca Group) as well as Dwyka Group diamictites form the underlying geology of the study site and area in which Northern Upper Karoo veldtype dominants. Jurassic Karoo Dolerite sills and

sheets support this vegetation complex in places. Superficial deposits, including calcretes, of the Kalahari Group cover wide stretches of land in the region (Mucina & Rutherford, 2006). Soils are variable from shallow to deep, red-yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms. Land types are mostly those of Ae, Ag and Fc. Refer to Table 9 for short description of the land types found in the region.

Table 9: Description of land types found in the region

Land Type	Description
Ae	Red-yellow apedal, freely drained soils (Red, high base status soils, > 300 mm deep, without dunes). Moderately deep (average 500-1200 mm) red, freely drained, apedal (= structureless) soils. Soils occur in areas associated with low to moderate rainfall (300-700 mm per annum) in the interior of South Africa and have a high fertility status. A wide range of texture occurs (usually sandy loam to sandy clay loam).
Ag	Red-yellow apedal, freely drained soils (Red, high base status soils, < 300 mm deep). These shallow (< 300 mm), red, freely-drained, apedal (= structureless) soils occur in arid to semi-arid areas associated with low rainfall (< 500 mm per annum) and are underlain by hard to weathered rock. A wide range of textures may occur (usually loamy sand to sandy loam). Stones or rocks are often present on the soil surface.
Fc	Glenrosa and/or Mispah forms (other soils may occur); lime generally present in the entire landscape. Generally shallow soils consisting of a topsoil directly underlain by weathered rock (Glenrosa form) or hard rock (Mispah form), sometimes with surface rock and steep slopes. Found in drier areas than some of the broad soils patterns of the region or areas on base-rich parent materials, so that lime occurs throughout the landscape.

5.4 LAND USE

The landcover of the study area is predominantly open, Karoo shrubland, with little to no development, dwellings and structures. The area is mostly used for grazing of livestock, with low levels of cultivation type agriculture. The levels of urbanisation are very low, with the small town of De Aar being the highest nearby urban area.

5.5 BIODIVERSITY BACKGROUND

5.5.1 Vegetation

The study site is situated in the Nama-Karoo Biome of South Africa. Refer to **Figure 14**. The site is within the original extent of the veldtype (or ecosystem) known as Northern Upper Karoo. The veldtype is part of the Upper Karoo Bioregion of the Nama-Karoo Biome.

The Nama-Karoo flora is not particularly rich, and in comparison with analogous biomes on other continents, does not stand out in contrast to the Succulent Karoo (Cowling et al. 1998). The Nama-Karoo Biome does not contain any centre of endemism (Van Wyk & Smith 2001). Unlike other biomes of South Africa, local endemism is very low (with the highest number of local endemics concentrated in the Upper Karoo Hardeveld). Asteraceae (daisy family), Fabaceae (pea family) and Poaceae (grasses) are the dominant

families in the Nama-Karoo, which is common in the floral make-up of arid and semi-arid regions. In the north and east of the Nama-Karoo Biome Poaceae, Fabaceae and elements of tropical summer-rainfall floras (i.e. Acanthaceae, Capparaceae and Cucurbitaceae) become more prevalent (Mucina & Rutherford, 2006, 2010).

The Nama-Karoo Biome is subdivided into three broad Bioregions, namely, Upper Karoo, Lower Karoo and Bushmanland & West Griqualand. Refer to **Figure 14**. The hierarchy of the vegetation units (veldtypes) in which the study site is situated is shown below in Table 10.

Table 10: Hierarchy of vegetation of the study site

Category Description	Classification
Biome	Nama-Karoo
Bioregion	Upper Karoo
Vegetation Types	Northern Upper Karoo
Conservation Status	Least Threatened / Least Concern

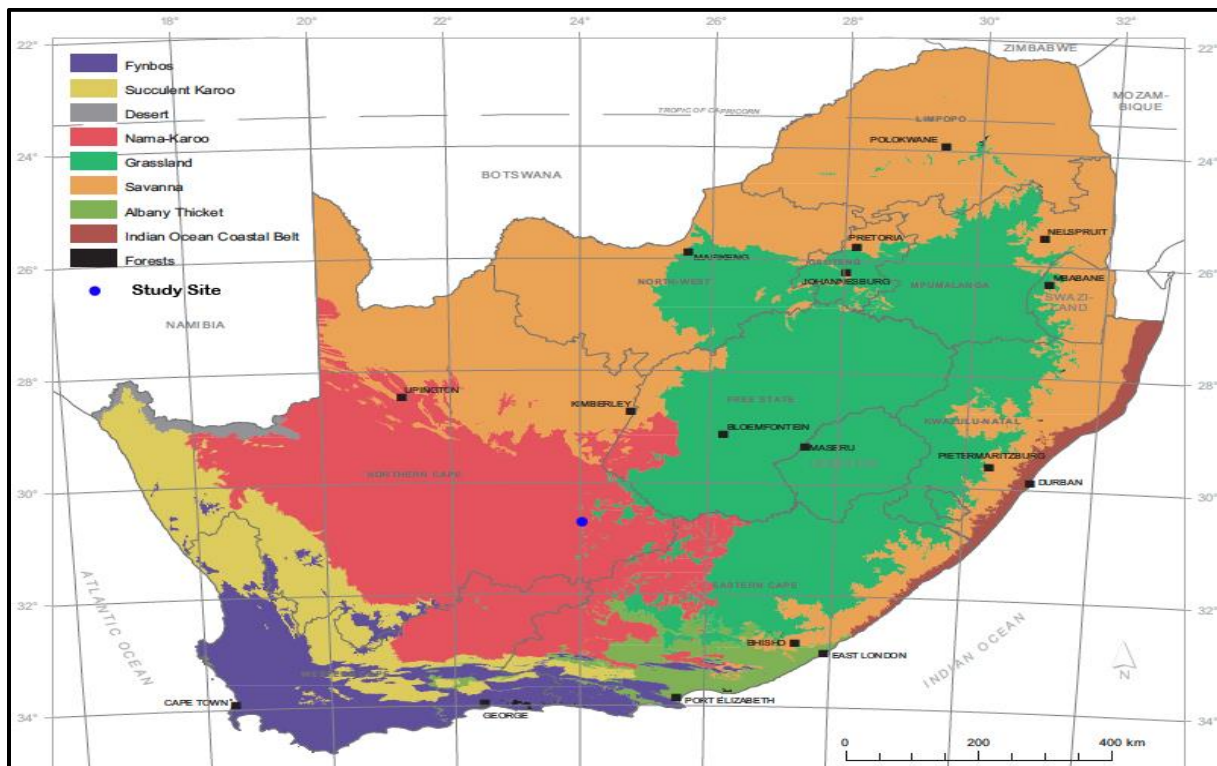


Figure 14: Biomes

Northern Upper Karoo is a veldtype (or ecosystem) that is characterised by shrubland dominated by dwarf Karoo shrubs, grasses and *Acacia mellifera* subsp. *detinens* (*Vachellia mellifera*) and some other low small trees (especially on sandy soils in the northern parts and vicinity of the Orange River). The topography tends to be flat to gently sloping plains, with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans (Mucina & Rutherford, 2006).

5.5.2 Protected Trees

The only potential protected tree species occurring in the region and potentially the study site is the Shepherd's tree (*Boscia albitrunca*). However, during previous investigations (Hoare, 2012) and the latest investigations undertaken for this study on the 11th of October 2020, no Shepherd's trees were found on site. It is therefore safe to say that there are no protected trees in the study area.

5.5.3 CONSERVATION STATUS

The study site is situated within the veldtype of Northern Upper Karoo, which is not a threatened ecosystem. For the conservation statuses of the veldtypes (ecosystems) and a short description of their statuses refer to Table 11.

Table 11: Veldtype status

Veldtype	Status	Information
Northern Upper Karoo	Least Threatened (LT) or Least Concern (LC)	Little to no none of the veldtype is conserved in statutory conservation areas (formal protected areas). About 4%+ has been cleared for cultivation (the highest proportion of any type in the Nama-Karoo) or irreversibly transformed by building of dams (Houwater, Kalkfontein and Smart Syndicate Dams). Areas of human settlements are increasing in the northeastern part of this vegetation type (Hoffman <i>et al.</i> 1999). Erosion is moderate (46.2%), very low (32%) and low (20%).

The Biodiversity Act, 2004 (Act No.10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The main purpose for the listing of threatened ecosystems is an attempt to reduce the rate of ecosystem and species destruction and habitat loss, leading to extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI). The criteria for determining the status of an ecosystem (or veldtype) are shown below in **Table 12**, with the levels or structure shown in **Figure 15** (Mammal Red List, 2016).

Table 12: Ecosystem Status: Simplified explanation of categories used

STATUS	% Transformed	Effect on Ecosystem
Least Threatened (LT) / Least Concerned (LC)	0-20% (<20% loss)	No significant disruption of ecosystem functions
Vulnerable (VU)	20-40% (>20% loss)	Can result in some ecosystem functions being altered
Endangered (EN)	40-60% (>40% loss)	Partial loss of ecosystem functions
Critically Endangered (CR)	>60% or BT Index for that specific veldtype	Species loss. Remaining habitat is less than is required to represent 75% of species diversity

Source: South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. 2004. SANBI. Mucina & Rutherford (eds) (2010).

Note: BT stands for the Biodiversity Threshold and is an index value that differs for each veldtype. In other words, because the composition, recovery rate, etc. differs for each veldtype there will be a different threshold (in this case percentage transformed) at which species become extinct and ecosystems breakdown. That is, at which point the veldtype is critically endangered. For the grassland vegetation units discussed the index value (BT) is broadly given as 60% and greater.

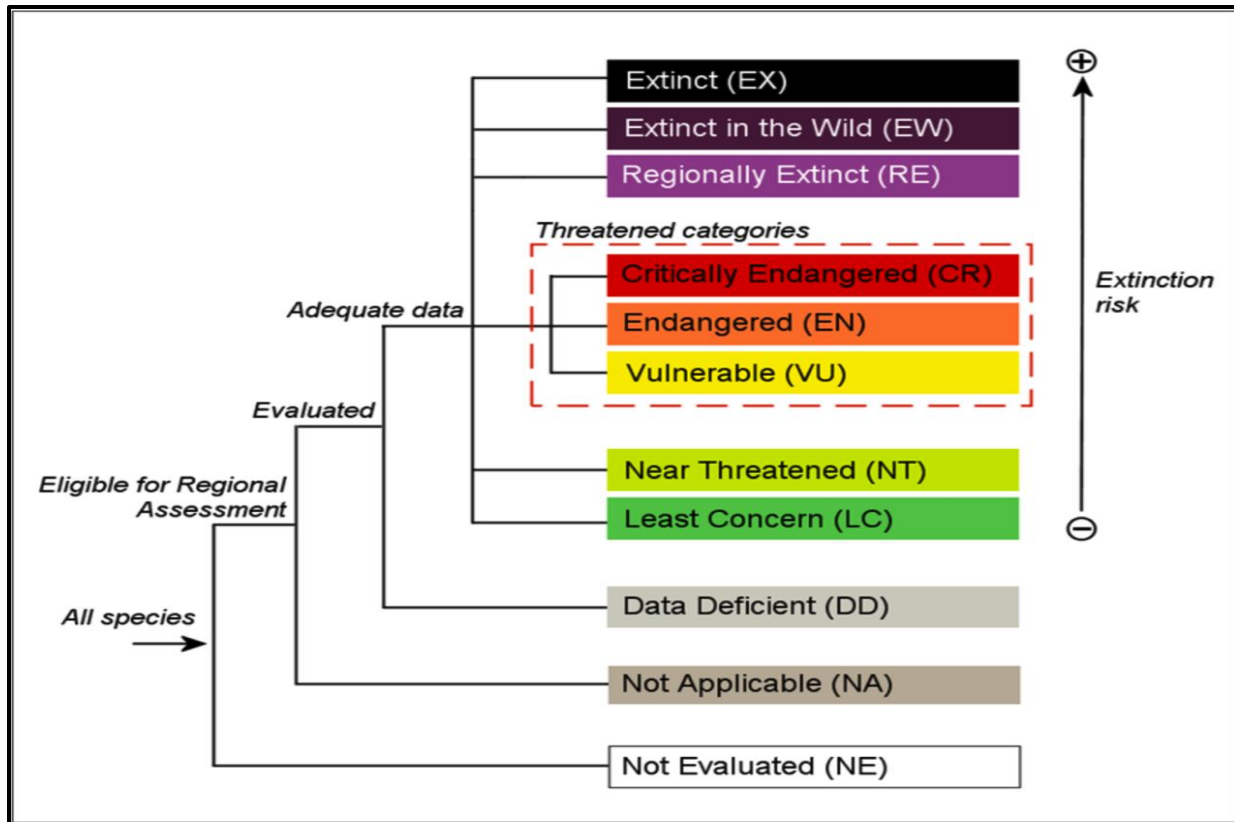


Figure 15: Structure of categories used at the regional level

5.5.4 Alien plants identified in the Study Area

During the site investigation a few Alien Plant Species were identified in the study area. The main weed species present in the area is Honey Mesquite (*Prosopis glandulosa*). Honey Mesquite is a Category 2 declared weed. There were no major areas of invasive weed infestation.

The categories are as set out in the Conservation Act of Agricultural Resources Act, 1983 (CARA) (Act 43 of 1983) and more recently NEM:BA, 2004 (Act No. 10 of 2004): Alien Invasive Species List 2016).

Prosopis glandulosa is regarded as one of the 12 agriculturally most important invasive alien plants in South Africa, and is widely distributed in Northern Upper Karoo veldtype (Hoffman et al. 1999). *Prosopis* occurs in generally isolated patches, with densities ranging from very scattered to medium (associated with the lower Vaal River drainage system and the confluence with the Orange River) to localised closed woodland on the western border of the unit with Bushmanland Basin Shrubland (Mucina & Rutherford, 2006).

5.6 FAUNA

5.6.1 Mammals

There is one mammal species of low conservation concern that could potentially occur in the general area, namely, Geoffroy's Horseshoe Bat. The bat is a cave-dwelling species, which limits its distribution. There

are no caves in the study area and therefore no roosting / ideal habitat. However, there is a very low possibility that there are some bats dwelling in rock crevices in the hills east and northeast of the site.

Black-footed cat and Cape fox are two mammals that are protected under the National Environmental Management: Biodiversity Act and may potentially occur in the region. It is possible that that these species may traverse the site while foraging, but that it was unlikely that they would occur there as permanent residents. This is primarily due to the close proximity of the site to the town of De Aar. The proximity of humans and domestic animals, such as dogs, are factors that would lead to these animals not occurring on site (Hoare, 2012).

There are no reptile species of conservation concern that have a distribution that includes the study area.

5.6.2 Avifauna

There are 10 priority bird species that have a medium to medium/high probability of occurring on the study site from time to time. Seven are threatened species all with a status of 'Vulnerable' and three with a status of 'Near Threatened'. The species likely to use parts of the site for breeding are the Blue Crane (*Anthropoides paradiseus*), Blue Korhaan (*Eupodotis caerulescens*), Kori Bustard (*Ardeotis kori*), Ludwig's Bustard (*Neotis ludwigii*) and Secretarybird (*Sagittarius serpentarius*). The other species, the African Marsh Harrier (*Circus ranivorus*), Lanner Falcon (*Falco biarmicus*), Lesser Kestrel (*Falco naumanni*), Martial Eagle (*Polemaetus bellicosus*) and Tawny Eagle (*Aquila rapax*), may use the site or parts of the site for foraging. Large flocks of Lesser Kestrel have been observed in this area during previous field surveys (Hoare, 2012).

According to Hoare (2012) the only faunal species of concern potentially occurring on the study site are avifaunal species, namely: Blue Crane (VU), Blue Korhaan (NT), Kori Bustard (VU), Ludwig's Bustard (VU), and Secretarybird (NT).

5.6.3 Faunal Hotspots

The maps below show the areas of South Africa that are hotspots for faunal species of conservation concern for snakes, lizards and butterflies. Refer to **Figure 16**, **Figure 17** & **Figure 18**. The study site is not situated within any quadrants that are hotspots for snakes, lizards or butterflies. The topography and climate of the study area are not ideal for many species of butterflies and lizards, in particular. Butterflies tend to be very specific as to the host trees or shrubs they lay their eggs on and the study site is all but void of trees and shrubs. Lizards ideally prefer rocky outcrops, ridges with good cover and enough vegetation, which lures in potential prey / food for them. This along with good rainfall leads to the lack of ideal habitats for many of these faunal groups.

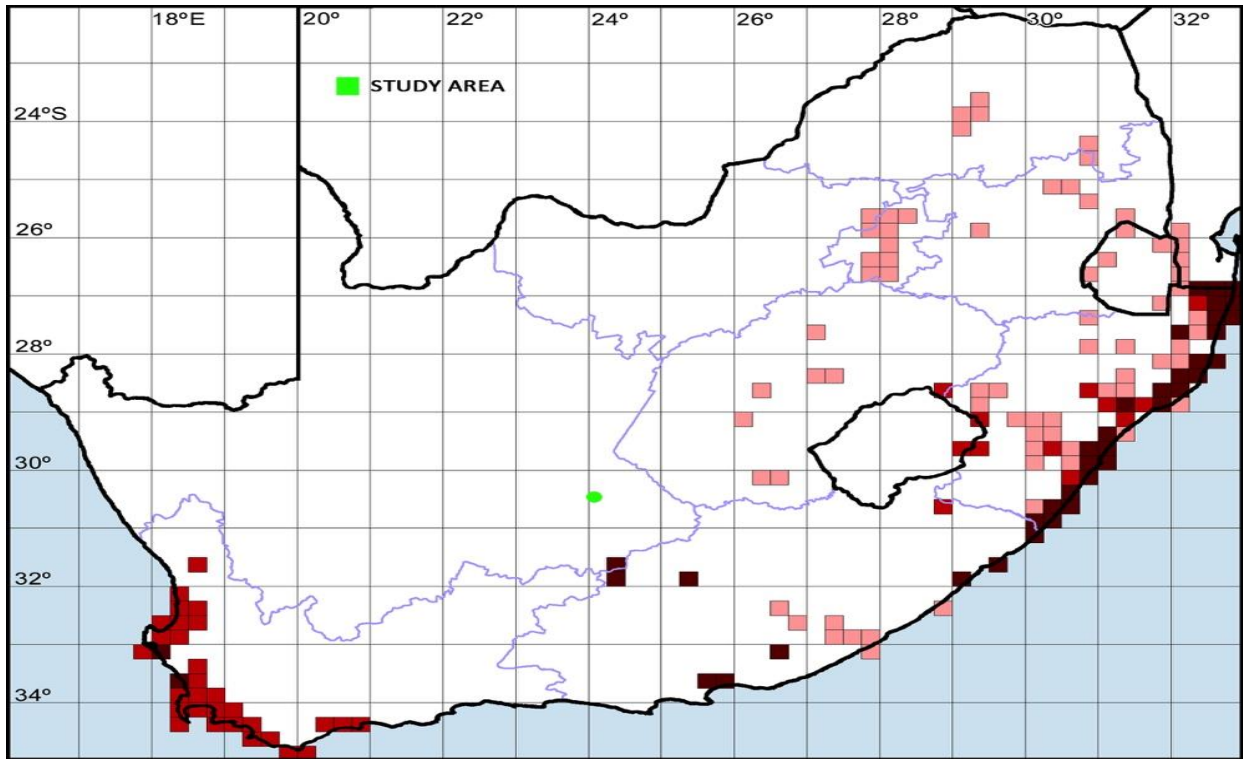


Figure 16: Snake hotspots

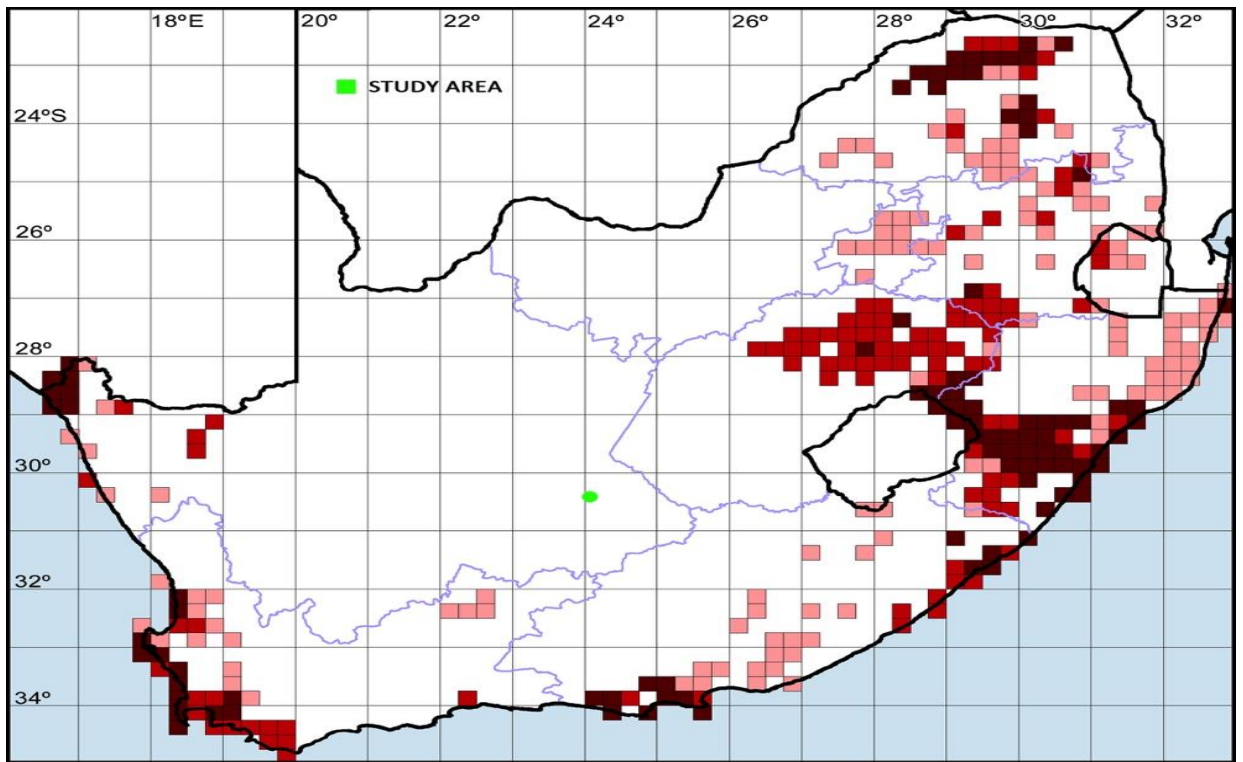


Figure 17: Lizard hotspots

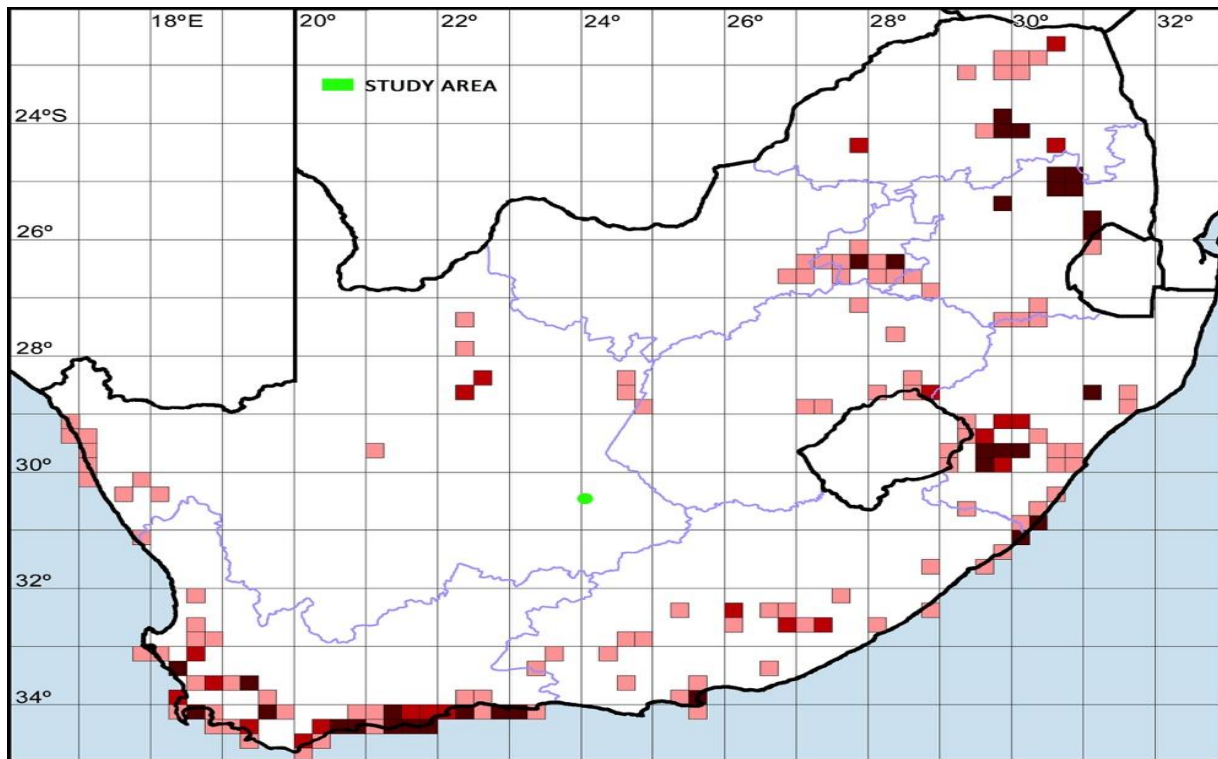


Figure 18: Butterfly hotspots

5.7 WATERCOURSES AND HYDROLOGY

The aquatic ecology focuses on the natural surface water (watercourses) within the study site. These watercourses include wetlands, rivers, streams, pans, lakes and natural drainage lines. Manmade structures such as dams or canals are also considered, although these are not necessary as sensitive as natural systems. A pan (freshwater and saltwater) is a type of wetland and must be approached as such. The focus is to delineate watercourses and limit any impact the project might have on these watercourses. All watercourses in South Africa, regardless of their actual condition or ecological state are, by default, viewed as sensitive.

5.8 WATERCOURSES IN THE STUDY AREA

There are no perennial rivers or even semi-perennial rivers in the study area. The main river in the region is the Brak River, which is a semi-perennial river in the area of the study site and that flows north of the study site in a generalised southeast to northwest direction and eventually into the Orange River. Refer to Figure 19. Mapping datasets from Department of Water and Sanitation (DWS) (as used in **Figure 19**) only shows two smaller seasonal unnamed streams in the region that are tributaries of the Brak River.

East along the study site is a broad, shallow ancient floodplain or river system that feeds into the Brak River. The area is clearly visible in satellite photos as a lighter colour than the surrounding areas. However, these photos can give the false impression that these systems (which are common in the dry Karoo and Kalahari regions of the country) are active rivers, which they are not. The area east of the study site is a highly

erratic and ephemeral watercourse (drainage system), which almost never flows, end to end, even during periods of significant rainfall. The 1:100 year floodlines do not even extent beyond the boundaries of drainage system. SANBI Wetland mapping datasets classify the system as a river.

During site investigations (10 & 11 October 2020) some small patches of surface water were found scattered within the 'river bed' / valley area. Many of these are formed by either impounded surface water flow or boreholes that discharge water into a small impoundment to create a drinking area for livestock. Both are manmade activities and structures. It is possible that one or two are from natural shallow springs, but it is difficult to tell due to regular activities in and out of the sites.

The latest dataset for NFEPA systems and Watercourses obtained from SANBI is Wetland Map 5 (2018) (www.bgis.sanbi.org). According to Wetland Map 5 the watercourse east of the study site is classified as a river, which is correct and was verified during site investigations (ground-truthing).

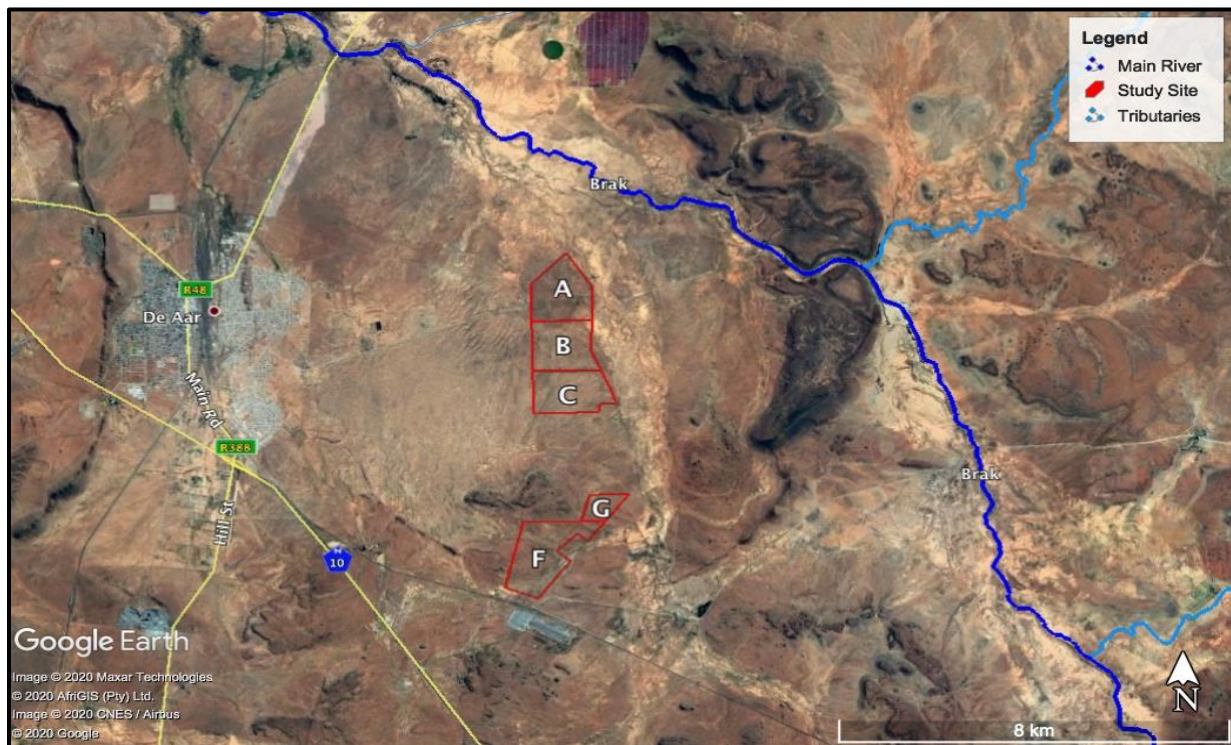


Figure 19: Main rivers in the area

5.8.1 Classification of Watercourses in the Study Area

There are no perennial rivers, streams or wetlands in the study area itself. There is a drainage system east of the site. These watercourses were identified and delineated during field investigations, up to Level 4, in terms of various levels as refined for South Africa by Kleynhans, *et. al.* (2005) and used in the Classification System for Wetlands user manual – SANBI Series 22 (Ollis *et. al.* 2013). Refer to **Table 13**.

Table 13: Classification levels 1 - 4

LEVEL 1 System	LEVEL 2 Regional setting (Ecoregion)	LEVEL 3 Landscape Unit	LEVEL 4 HGM Unit	
			HGM Type	Landform
Inland	SA Ecoregions according to DWS and/or NFEPA	Valley floor Slope Plain Bench	River	Mountain headwater stream Mountain stream Transitional stream Upper foothill Lower foothill Lowland Rejuvenated foothill Upland floodplain
			Channeled valley bottom wetland	
			Unchannelled valley bottom wetland	
			Floodplain Wetland	
			Depression	Exorheic Endorheic Dammed
			Seep	With channel outflow (connected) Without channel outflow (disconnected)
			Wetland flat	

Table 14: Classification of Watercourses

Delineated systems	Level 1 System	Level 2 Regional Setting (Ecoregion)	Level 3 Landscape Unit	Level 4 HGM Unit
Brak River	Inland	Upper Nama-Karoo	Valley Floor	River (Lowland)
Tributaries	Inland	Upper Nama-Karoo	Valley Floor	River (Lowland)
Drainage System	Inland	Upper Nama-Karoo	Valley Floor	River (Lowland)

5.8.2 Drainage Areas

The study area is situated within the Primary Drainage Area (PDA) of **D** and the Quaternary Drainage Area (QDA) of **D62D**. The catchment area is within the Orange Water Management Area (WMA 6) and under the jurisdiction of the Orange Catchment Management Agency (CMA 6). Refer to Figure 22. The site is not situated within a priority quaternary drainage catchment, in terms of guidelines and legislation from the

Department of Water & Sanitation (DWS). The table below gives a summary of the catchment areas and management areas for the study site. Refer to **Table 15**.

South Africa is geographically divided up into a number of naturally occurring Primary Drainage Areas (PDAs) and Quaternary Drainage Areas (QDAs). Refer to **Figure 20**. The different areas are demarcated into Water Management Areas (WMAs) and Catchment Management Agencies (CMAs). Until fairly recently there were 19 WMAs and 9 CMAs. Refer to **Figure 21** shows the extent of the old (or previous) Water Management Areas (WMAs). As of September 2016, these were revised and there are now officially only 9 WMAs, which correspond directly in demarcation to the 9 CMAs (**Figure 22**) (Government Gazette, 16 September 2016. No.1056, pg. 169-172).

Table 15: Summary of Catchment Areas for the study site

Level	Category
Primary Drainage Area (PDA)	D
Quaternary Drainage Area (QDA)	D62D
Water Management Area (WMA) – Previous / Old	Lower Orange
Water Management Area (WMA) – New (as of Sept. 2016)	Orange (WMA 6)
Sub-Water Management Area	Orange Tributaries
Catchment Management Agency (CMA)	Orange (CMA 6)
Wetland Vegetation Ecoregion	Upper Nama-Karoo
Strategic Water Source Area (SWSA)	Yes (De Aar)
Priority Quaternary Catchment	No
Fish FEPA	No
Fish FSA	No
Fish Corridor	No
Fish Migratory Corridor	No
Priority Quaternary Catchment	No

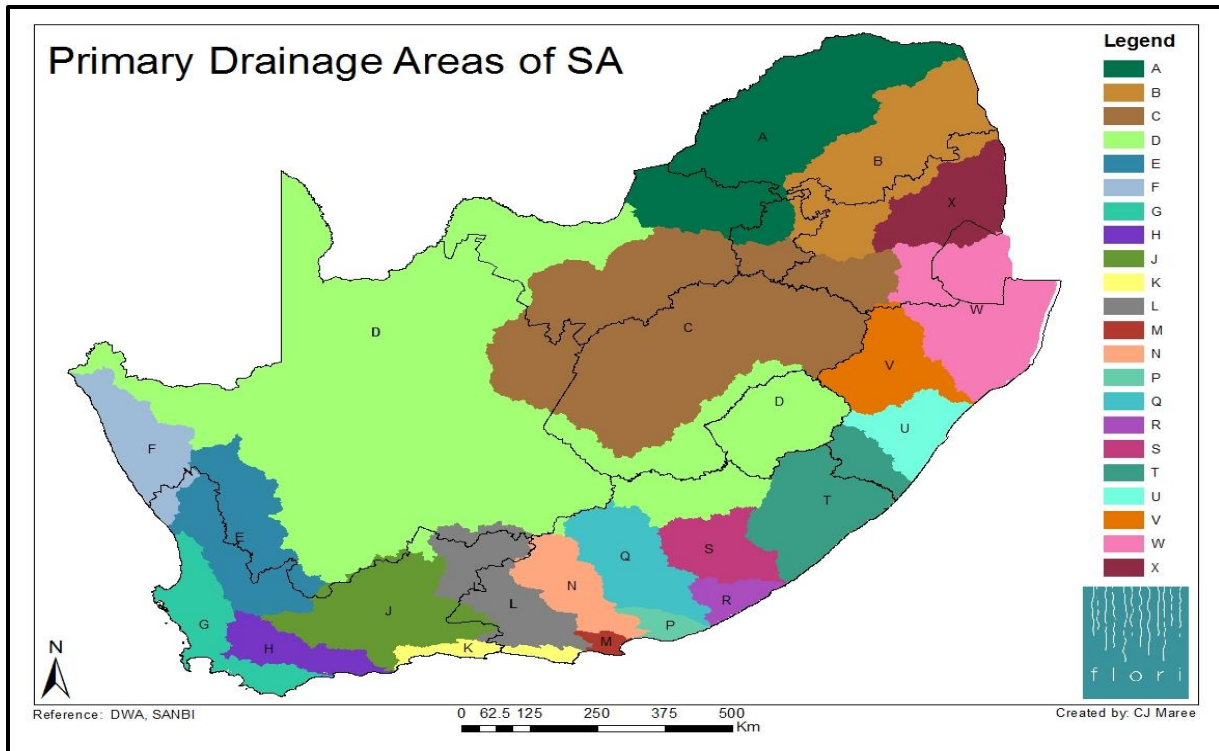


Figure 20: Primary drainage areas of South Africa

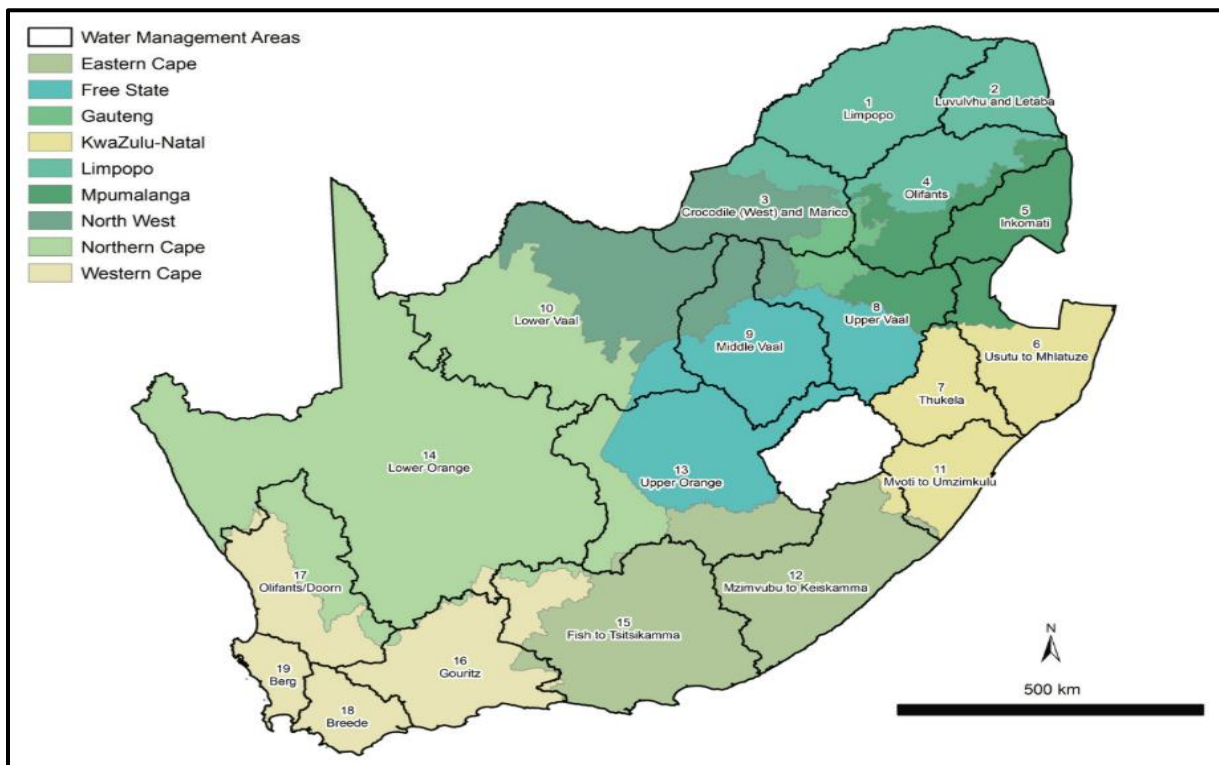


Figure 21: Old WMAs of South Africa

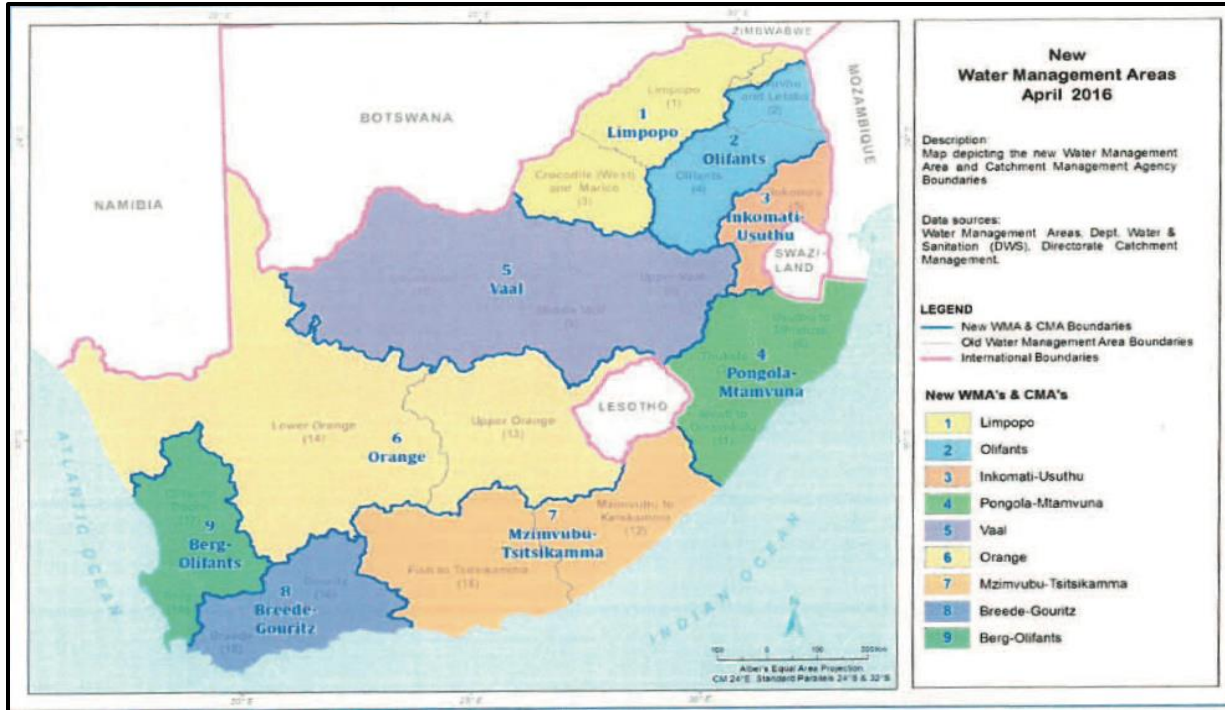


Figure 22: New WMAs & CMAs of South Africa

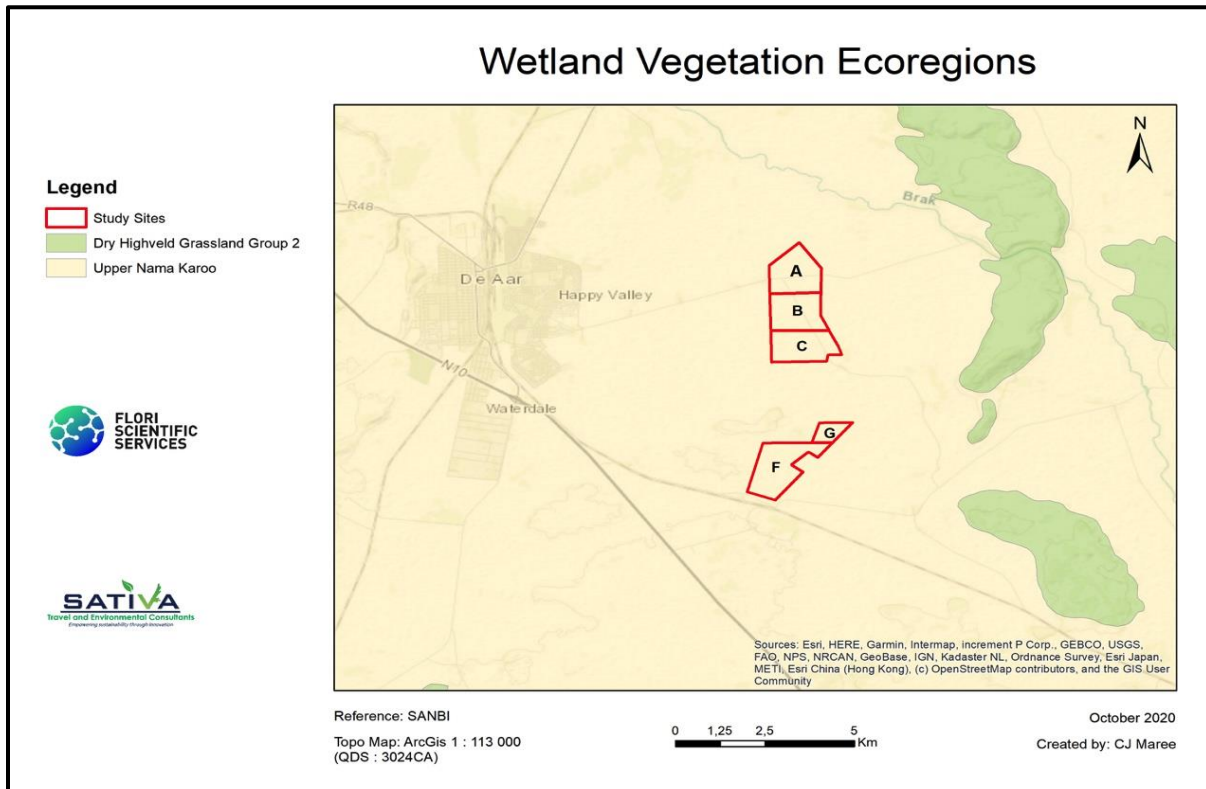


Figure 23: Wetland Vegetation Ecoregions

5.8.3 Strategic Water Source Areas (SWSA) of South Africa

The study area is not situated within a national Strategic Water Source Area (SWSA) of South Africa. Refer to **Figure 24**). However, it is within a provincial or local Water Source Area (WSA) known as the De Aar WSA. Refer to **Figure 25**.

The area in which the study site is situated is a dry part of the country and does not have significant surface water run-off. However, the area has important (or is important) in terms of ground water sources. Either in terms of high ground water recharges levels or good aquifers that are important sources of freshwater. It is important to emphasize that the project will not have an impact at all on the ground water of the area.

A national Strategic Water Source Areas of South Africa (SWSA) are those areas that supply a disproportionate amount of mean annual runoff in relation to the size of the geographical region. These areas are important because they have the potential to contribute significantly to overall water quality and supply, supporting growth and development needs that are often a far distance away. These areas make up 8% of the land area across South Africa, Lesotho and Swaziland, but provide 50% of the water in these countries (SANBI).

A Water Source Area (WSA) is a water catchment or aquifer system that either supplies a relatively large volume of water for its size, or is the primary source of water for a town, city or industrial activity. Strategic Water Source Areas (SWSAs) are defined as areas of land that either: (a) supply a disproportionate (i.e. relatively large) volume of mean annual surface water runoff (i.e. water in streams, rivers and wetlands) in relation to their size and so are considered nationally important; or (b) have relatively high groundwater recharge and groundwater forms a nationally important resource (has high levels of use or settlements depend on it); or (c) areas that meet both criteria (a) and (b). A SWSA_{SEP} is one where the water that is supplied is considered to be of national importance for water security, but there are others, which are considered to be of sub-national importance like De Aar WSA (WRC, 2019).

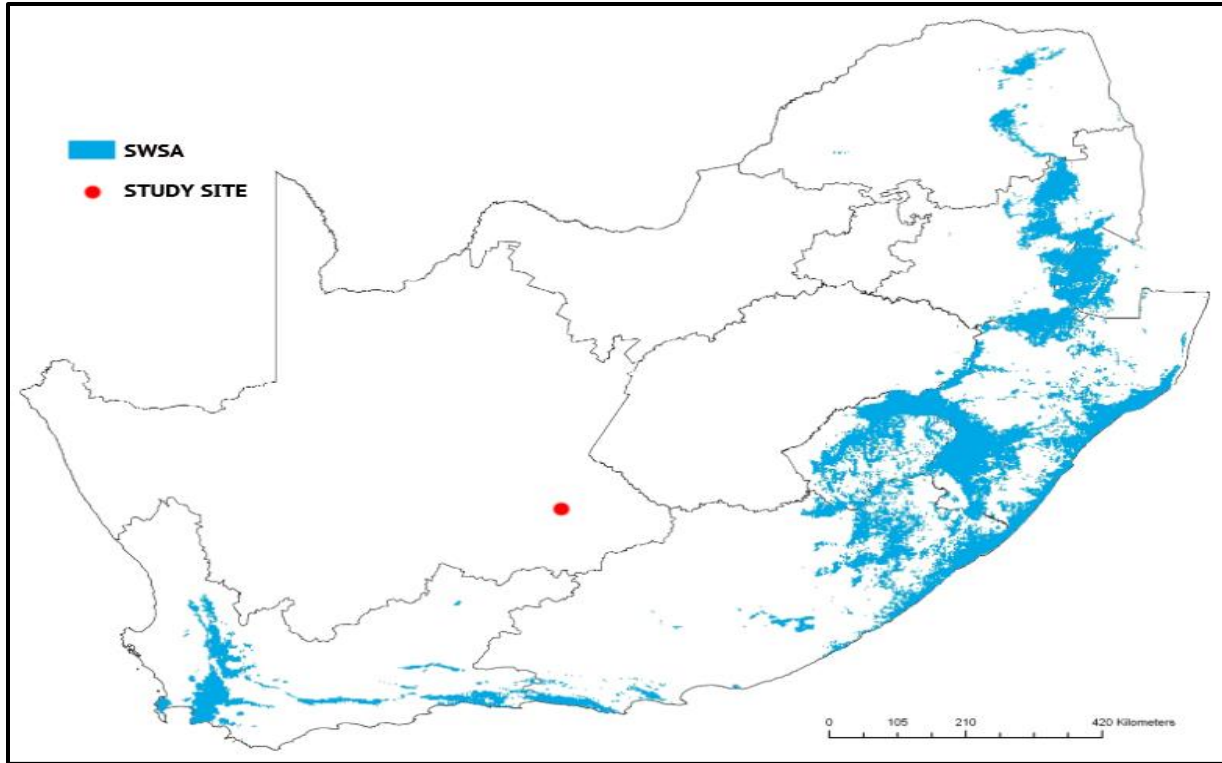


Figure 24: National SWSA of South Africa

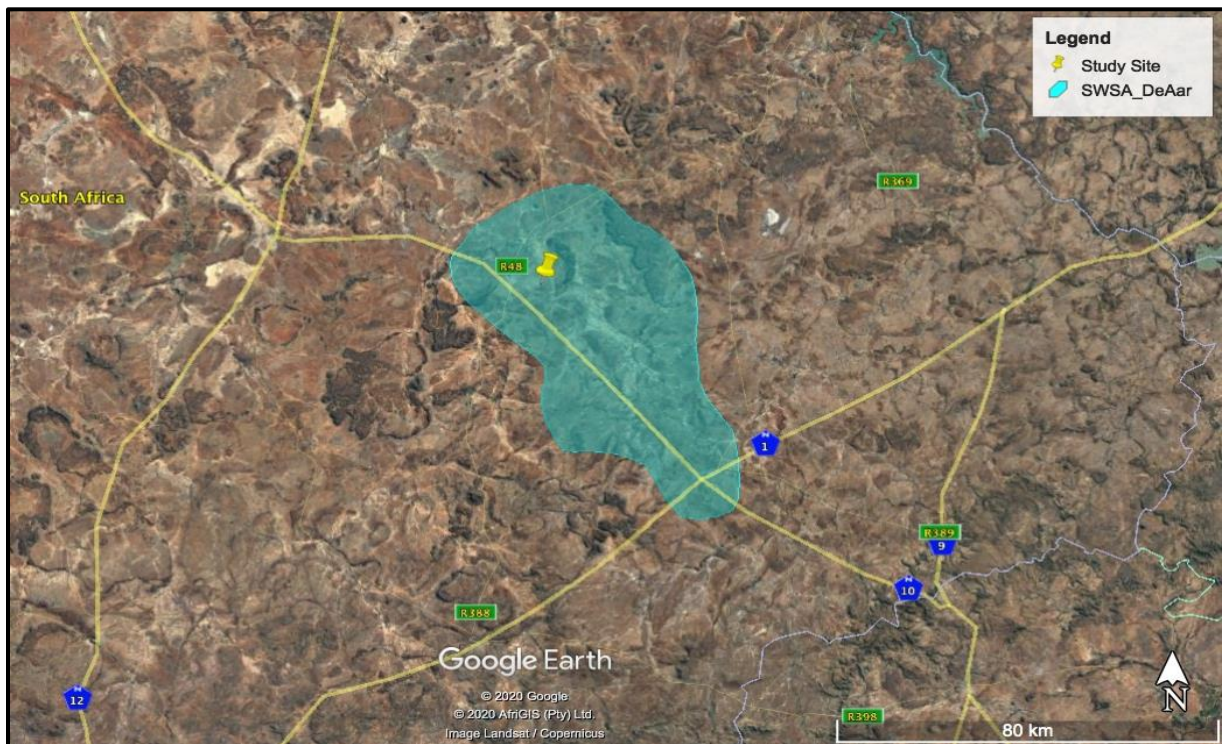


Figure 25: Water Source Area (De Aar)

5.8.4 PES of Watercourses in the Study Area

The assessment criteria and structure to determine the PES of watercourses is based on the modified Habitat Integrity approach of Kleynhans (1996, 1999). The PES is calculated by looking at the hydrology, geomorphology, water quality and biota of each watercourse. Of importance is the overall PES of the system. The present ecological state of the Brak River and the unnamed river east of the study site were assessed. Refer to **Table 16**.

Table 16: PES of watercourses in the study area

Criteria	Identified Watercourses	
	Unnamed Dry River	Brak River
HYDROLOGY		
Flow modification	3	4
Permanent inundation	3	4
WATER QUALITY		
Water Quality Modification	3	4
Sediment Load Modification	3	4
GEOMORPHOLOGY		
Canalisation	3	3
Topographic Alteration	3	4
BIOTA		
Terrestrial Encroachment	3	4
Indigenous Vegetation Removal	3	4
Invasive Plant Encroachment	3	3
Alien Fauna	4	3
Over utilisation of Biota	3	4
Total:	34	41
Average:	3,0	3,7
Category:	C	B
Integrity (PES):	Medium	High
PES Description	Moderately Modified	Largely Natural
Recommended EMC	C	B

5.8.5 EIS of Watercourses in the Study Area

The EIS values of the watercourse/s were determined using the above methodology. The calculations and categories are shown below in **Table 17**.

Table 17: EIS and EMC values of watercourses

Determinant	Unnamed Dry River	Brak River	Confidence
PRIMARY DETERMINANTS			
1. Rare & Endangered Species	0	2	4
2. Populations of Unique Species	1	2	4
3. Species/taxon Richness	1	2	4
4. Diversity of Habitat Types or Features	1	3	4
5. Migration route/breeding and feeding site for wetland species	0	2	3
6. Sensitivity to Changes in the Natural Hydrological Regime	1	2	3
7. Sensitivity to Water Quality Changes	1	2	3
8. Flood Storage, Energy Dissipation & Particulate/Element Removal	1	2	3
MODIFYING DETERMINANTS			
9. Protected Status	0	0	4
10. Ecological Integrity	1	1	4
TOTAL	7	18	-
AVERAGE	0,7	1,8	-
Overall EIS	D	C	-
Description	Low	Moderate	-

5.9 SOCIO-ECONOMIC ENVIRONMENT

De Aar is the main town of Pixley ka Seme serving a total of 24 other towns. Emthanjeni has in recent time seen the influx of investment in Renewable energy projects and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure. De

Aar is therefore the ideal place to establish industries, a fact which can be borne out by various major industries which have already established themselves in the region.

The central location and excellent rail and road links have resulted in several chain stores opening branches. The Emthanjeni area is increasingly becoming the centre for supplying the whole country with the famous “Karoo” mutton with its unique flavour and quality. This should enable the second economy initiatives to become active contributors to the economy of Emthanjeni as well as the entire district. Agriculture forms the backbone of Emthanjeni economy and accounts for the largest labour/ employment contributor to date. Despite the harsh climate and poor carrying capacity of the veldt, it still offers opportunities for growth and employment creation. The Manufacturing sector shows potential of growth through the introduction of Renewable energy projects in De Aar and surrounding areas.

The Municipality is therefore convinced that the Renewable Energy projects and New District Hospital and further developments planned for the area would grow the economy enormously. As a result of Transnet scaling down its activities as well as smaller businesses closing down from time to time, economic activity in the area is stagnating.

6 IMPACT ASSESSMENT METHODOLOGY

An environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of an activity. An impact may be the direct or indirect consequence of an activity. A description of potential impacts or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

6.1 IMPACT ASSESSMENT METHODOLOGY

The section below is the method used for determining the significance of impacts. Each of the impacts were listed taking into consideration the different phases (construction, operation, decommissioning). A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment was provided. Impacts and risks were identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (a) can be reversed; (b) may cause irreplaceable loss of resources; and (c) can be avoided, managed or mitigated.

The specialist studies are synthesised and integrated into the overall impact assessment and recommendations for mitigation are included in the EMPr (During Impact Assessment stage). The contents of all the specialist reports will include information as prescribed in Regulation 32(3) of the EIA Regulations, 2010 and provide preference ranking of the site.

In addition the following was identified:

- positive and negative impacts that the proposed activity 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;
- the possible mitigation measures that could be applied and level of residual risk; and

The following methodology was applied to the prediction and assessment of impacts/risks. Potential impacts were rated in terms of the direct, indirect and cumulative:

- Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- Nature of impact - this reviews the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”

Table 18: Potential Intensity/Severity Rating

Potential Intensity Description (negative)	Intensity	Score
Change is slight, often not noticeable, natural functioning of environment not affected.	Negligible	1
Natural functioning of environment is minimally affected. Natural, cultural and social functions and processes can be reversed to their original state.	Low	2
Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.	Medium	3
Cultural and social functions and processes disturbed – potentially ceasing to function temporarily.	High	4
Natural, cultural and social functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.	Very high	5

Note that the concept of “irreplaceable loss of a resource” is to be taken into account in the Potential Intensity score of an impact

- Irreplaceability of resource loss caused by impacts –
 - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable);
 - Moderate irreplaceability of resources;
 - Low irreplaceability of resources; or
 - Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

- Spatial extent – The size of the area that will be affected by the risk/impact:

Extent Description	Score
Site specific (Impacted area is only at the site – the actual extent of the activity).	1
Local (impacted area is limited to the site and its immediate surrounding area).	2
Regional (Impacted area extends to the surrounding area, the immediate and the neighboring properties).	3
Provincial (Impact considered of provincial importance).	4
International/Global (e.g. Greenhouse Gas emissions or migrant birds).	5

- Duration – The timeframe during which the risk/impact will be experienced:
 The concept of “reversibility” is reflected in the duration scoring. I.e. the longer the impact endures the less likely it will be reversible.

Duration Description	Score
Temporary (less than 3 year) or duration of the construction period. This impact is fully reversible. E.g. the construction noise temporary impact that is highly reversible as it will stop at the end of the construction period	1
Medium term (3 to 10 years). The impact is reversible with the implementation of appropriate mitigation and management actions.	2
Long term (> 10 years but where the impact will cease after the operational life of the activity). The impact is reversible with the implementation of appropriate mitigation and management actions. E.g. the noise impact caused by the desalination plant is a long term impact but can be considered to be highly reversible at the end of the project life, when the project is decommissioned	3
Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient). This impact is irreversible. E.g. The loss of a palaeontological resource on site caused by construction activities is permanent and would be irreversible.	4
Permanent – no mitigation measures of natural process will reduce impact after implementation – impact will remain after operational life of project.	5

Reversibility of impacts -

- High reversibility of impacts (impact is highly reversible at end of project life, i.e. this is the most favorable assessment for the environment. For example, the nuisance factor caused by noise

impacts associated with the operational phase of an exporting terminal can be considered to be highly reversible at the end of the project life);

- Moderate reversibility of impacts;
- Low reversibility of impacts; or
- Impacts are non-reversible (impact is permanent, i.e. this is the least favorable assessment for the environment. The impact is permanent. For example, the loss of a paleontological resource on the site caused by building foundations could be non-reversible).

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

- Probability – The probability of the impact/risk occurring:

Probability Description	Score
Improbable (little or no chance of occurring <10%)	1
Low Probability (10 - 25% chance of occurring)	2
Probable (25 - 50% chance of occurring)	3
Highly probable (50 – 90% chance of occurring)	4
Definite (>90% chance of occurring).	5

- Magnitude–The anticipated severity of the impact (Intensity + Extent + Duration):
- Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
- Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
- Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
- Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).
- Significance – Will the impact cause a notable alteration of the environment? To determine the significance of an identified impact/risk, the consequence is multiplied by probability.

Impact Magnitude = Potential Intensity + duration + extent

Significance rating = Impact magnitude * Probability

Table 19: Guide to assessing risk/impact significance as a result of consequence and probability

Scoring	Significance rating	Description
81-100	Very High	The project cannot be authorised unless major changes to the design are carried out to reduce the significance rating.
60--80	High	The impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making.
45-59	Medium high	The impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated.
30-44	Medium Low	The impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making.
15-29	Low	The impact may result in very minor alterations of the environment and can be avoided through the implementation of mitigation measures.
1-14	Very Low	No action required.

- Significance was rated as follows (based on Table above)
 - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
 - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision making);
 - Medium (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or
 - High (the risk/impacts will result in a considerable alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision making).
 - Very high (the risk/impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision making
(i.e. the project cannot be authorized unless major changes to the engineering design are carried out to reduce the significance rating).

Impacts have been described both before and after the implementation of the proposed mitigation and

management measures. The scenario “without mitigation” considers all management actions already proposed by the proponent as part of the project description. “With mitigation” assesses the significance rating of the potential impact, taking into account any additional management actions recommended by the specialist.

Linked to the above, for each impact assessment, mitigation measures are generally listed under the following three categories (as applicable):

- Mitigation measures inherent to the project design (i.e. mitigation/management actions that the proponent had planned to implement as part of the project description);
- Key management actions proposed by specialist (pertinent measures that will be written into, and enforced through the EMPr for implementation to ensure that the significance of the associated impact is acceptable); and
- Additional management actions proposed by the specialist (management actions to be considered by proponent and authority).

The impact assessment has attempted to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

The above assessment must be summarised in an impact assessment Table as below.

Given the limited alternatives available one impact assessment has been done for the preferred Layout alternative.

7 POTENTIAL ENVIRONMENTAL IMPACTS

This Chapter has identified the potential environmental consequences of the proposed activity looking at the status quo analysed from the receiving environment. Furthermore, the potential for mitigation of negative impacts and enhancement of positive impacts are briefly described. These issues will be expanded upon and studied in greater detail in the EIA phase. The below impacts on the biophysical, socio-economic and cultural/historical environment have been assessed based on the methodology provided in Section 6. Specialist study methodologies are provided in the plan of study.

Table 20: Potential Impacts to be Assessed

Theme	Air Quality		
Phases	Construction Phase	Operation Phase	Decommissioning Phase
Nature and Status of Impact.	Generation of dust from site clearance and construction activities. Engine emissions from construction vehicles.	Emissions from the combustion of fuel in the Gas Engine / turbines. Engine / Turbine emissions from operational traffic	Generation of dust from site clearance and construction activities.
Theme	Terrestrial Fauna and Flora		
Nature and Status of Impact.	<ul style="list-style-type: none"> Loss of natural vegetation Loss or impact on wildlife Fringe impacts arising from construction phase 	<ul style="list-style-type: none"> Operational impacts on fauna (noise emissions emanating from the site) 	<ul style="list-style-type: none"> Decommissioning will leave the site vulnerable to erosion Decommissioning will leave the site vulnerable to alien plant invasion
Theme	Inland Aquatic Ecosystems Watercourses		
Nature and Status of Impact.	<ul style="list-style-type: none"> Damage to soil structure or shade out watercourse areas or 	<ul style="list-style-type: none"> Increase in stormwater runoff. Discharge of stormwater directly 	<ul style="list-style-type: none"> Damage to soil structure or shade out watercourse areas or

	<p>compaction of soils by construction activities.</p> <ul style="list-style-type: none"> Alterations to channel morphology, surface flow patterns, vegetation and soil condition. Pollution in sediments and a loss of permeability of soils. Bioaccumulation of toxins in locally-occurring biota. Organic pollution of soils and ecosystems. 	<p>into ephemeral watercourses. Road maintenance activities. Changes in hydrological regimes.</p> <ul style="list-style-type: none"> Changes in surface water flow patterns. Accumulation in sediments, and a loss of permeability of soils. Bioaccumulation of toxins in locally occurring biota. 	<p>compaction of soils by decommissioning activities.</p> <ul style="list-style-type: none"> Alterations to channel morphology, surface flow patterns, vegetation and soil condition. Pollution in sediments and a loss of permeability of soils. Bioaccumulation of toxins in locally-occurring biota. Organic pollution of soils and ecosystems.
Theme	Landscape and Visual Aspects		
Nature and Status of Impact.	<ul style="list-style-type: none"> Visual intrusion, dust and noise. Change in character of the area. 	<ul style="list-style-type: none"> Visual intrusion of infrastructure. Visual clutter of infrastructure on the open landscape. Effect of lighting at night on dark skies 	<ul style="list-style-type: none"> Remaining roads, platforms and slabs. Change in character of the area.
Theme	Noise Pollution		
Nature and Status of Impact.	<ul style="list-style-type: none"> Generation of noise from construction of the Plant may have an impact on sensitive receptors. Noise and vibration from 	<ul style="list-style-type: none"> Generation of noise from the Gas Engines / Turbines may have an impact on sensitive receptors. 	<ul style="list-style-type: none"> Noise and vibration from construction traffic along main transport/access routes.

	construction traffic along main transport/access routes.		
Theme	Traffic and Road Network		
Nature and Status of Impact.	<ul style="list-style-type: none"> • Increase in traffic associated with delivery vehicles for the Gas Engines / Turbines • Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads • Change in quality of surface condition of the roads. 	<ul style="list-style-type: none"> • No Impact as there will not be additional staff hired 	<ul style="list-style-type: none"> • Increase in traffic. • Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads • Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment. • Change in quality of surface condition of the roads
Theme	Avifauna		
	It is important to note that the PV Solar Park is already authorised. This project is specifically for the addition of the Gas Engines / Turbines. In Relation to the site and approved PV park, it is not envisaged that the Gas plant will have a significant additional impact on the Avifauna in the area.		
Theme	Landuse and Soils		
	It should be noted that the site is already approved to be used as a Solar PV Park. As such the change of land use has already been assessed and accepted during the previous EIA (Ages, 2013). The Gas Plant will be established within the existing approved footprint, and as such will not increase the impact on Land use and Soils.		

Theme	Heritage Resources
	<p>The main cause of impacts to archaeological sites is direct, physical disturbance of the archaeological remains themselves and their contexts. It is important to note that the heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example, a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from their original position.</p> <p>The previous field survey did not identify any graves within the study area or any other heritage resources of significance. Some MSA stone tools that include flakes and flake scrapers and triangular flakes were found in isolation on the different sections that are earmarked for development. However, the stone tools lack context and provenance and hence not much information can be reconstructed based on their disturbed context. The tools are partly weathered which shows that they were exposed to natural weather conditions like rain and were washed around the landscape by running water. These MSA findings are not unique but they are generally synonymous with other MSA findings from other MSA sites around the area, for example, Wonderwerck Cave from the same province which has also yielded MSA deposits.</p>
Theme	SOCIAL BASELINE, ECONOMY AND EMPLOYMENT
	<p>It should be noted that the site is already approved to be used as a Solar PV Park. As such the impacts associated with construction and operation of an electricity generating facility has already been assessed and accepted during the previous EIA (Ages, 2013). The Gas plant will be established within the existing approved footprint, and compliment the Solar PV Park, and as such will not increase the socio-economic impacts.</p>

8 PLAN OF STUDY

This Plan of Study, which explains the approach to be adopted to conduct the EIA for the proposed development was prepared in accordance with Appendix 2 of GN No.326 (7 April 2017).

8.1 ENVIRONMENTAL ASPECTS AND ISSUES IDENTIFIED DURING SCOPING PHASE

The Scoping exercise aimed to identify and qualitatively predict significant environmental issues for further consideration and prioritisation. During the EIA stage a detailed quantitative impact assessment will be conducted via contributions from the project team and requisite specialist studies, and through the application of the impact assessment methodology contained in **Section 6**. Suitable mitigation measures will be identified to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and will be incorporated into an EMPr.

Pertinent environmental issues identified during Scoping, which will receive specific attention during the EIA phase are listed in Section 7 of this report.

8.2 FEASIBLE ALTERNATIVES TO BE ASSESSED DURING EIA PHASE

The EIA phase will include a detailed comparative analysis of the project's feasible alternatives that emanate from the Scoping exercise, which will include environmental (with specialist input) and technical evaluations. This will ultimately result in the selection of a BPEO.

8.3 SPECIALIST STUDIES

In addition the Scoping Study will identify any fatal flaws, site alternatives and mitigation alternatives to be evaluated and investigated during the EIA phase of the project. Impacts related to, amongst others, biodiversity, heritage, Paleontology, air quality, noise and visual have been investigated in this EIA. Issues that are considered to be of significance will be recommended for further investigation and assessment within the EIA phase of the project.

Table 21: Specialist studies undertaken for submission with Environmental Impact report

NAME	ORGANISATION	Specialist field
Johannes Maree	Flori Scientific Services	Biodiversity Impact Study
Trust Mlilo	Integrated Specialist Services (Pty) Ltd	Heritage Impact Study
Francois Durand	Sole Provider	Desktop Paleontology study

Abdul Ebrahim	EScience Associates (Pty) Ltd	Air Quality Impact Study Green house Gas / Climate Change Study
Adam Bennett	ATB Environmental Consulting	Noise Impact Study
Elmie Weideman	Create Landscape Architecture and Consulting	Visual Impact Study
Willie Boucher	HiTechCivils	Traffic Impact Assessment

The Terms of Reference (ToR), both general and specific, for the abovementioned specialist studies follow in the sub-sections below. Amongst others, the *Guideline for determining the scope of specialist involvement in EIA processes* (Münster, 2005) as well as the specialist protocols of 2020 was used in compiling the general Terms of Reference for the specialist studies.

8.4 TERMS OF REFERENCE – GENERAL

The following general ToR apply to all the EIA specialist studies to be undertaken for the proposed project:

1. Address all triggers for the specialist studies contained in the subsequent specific ToR.
2. Address issues raised by IAPs, as contained in the Comments and Response Report, and conduct an assessment of all potentially significant impacts. Additional issues that have not been identified during Scoping should also be highlighted to the EAP for further investigations.
3. Ensure that the requirements of the environmental authorities that have specific jurisdiction over the various disciplines and environmental features are satisfied.
4. Approach to include desktop study and site visits, as deemed necessary, to understand the affected environment and to adequately investigate and evaluate salient issues. Indigenous knowledge (i.e. targeted consultation) should also be regarded as a potential information resource.
5. Assess the impacts (direct, indirect and cumulative) in terms of their significance (using suitable evaluation criteria) and suggest suitable mitigation measures. In accordance with the mitigation hierarchy, negative impacts should be avoided, minimised, rehabilitated (or reinstated) or compensated for (i.e. offsets), whereas positive impacts should be enhanced. A risk-averse and cautious approach should be adopted under conditions of uncertainty.
6. Consider time boundaries, including short to long-term implications of impacts for project lifecycle (i.e. pre-construction, construction, operation and decommissioning).
7. Consider spatial boundaries, including:
 - a) Broad context of the proposed project (i.e. beyond the boundaries of the specific site);
 - b) Off-site impacts; and

- c) Local, regional, national or global context.
8. The provision of a statement of impact significance for each issue, which specifies whether or not a pre-determined threshold of significance (i.e. changes in effects to the environment which would change a significance rating) has been exceeded, and whether or not the impact presents a potential fatal flaw or not. This statement of significance should be provided for anticipated project impacts both before and after application of impact management actions.
 9. Recommend a monitoring programme to implement mitigation measures and measure performance. List indicators to be used during monitoring.
 10. Appraisal of alternatives (including the No-Go option) by identifying the BPEO with suitable justification.
 11. Advice on the need for additional specialists to investigate specific components and the scope and extent of the information required from such studies.
 12. Engage with other specialists whose studies may have bearing on your specific investigation.
 13. Present findings and participate at public meetings, as necessary.
 14. Information provided to the EAP needs to be signed off.
 15. Review and sign off on EIA Report prior to submission to DEFF to ensure that specialist information has been interpreted and integrated correctly into the report.
 16. Sign a declaration stating independence.
 17. The appointed specialists must take into account the policy framework and legislation relevant to their particular studies.
 18. All specialist reports must adhere to Appendix 6 of GN No. 326 (7 April 2017) as well as the Specialist reporting protocols, March 2020.

8.5 SPECIFIC TERMS OF REFERENCE FOR SELECTED STUDIES

8.5.1 Terrestrial Ecological Impact Assessment

- Undertake baseline survey and describe affected environment within the project footprint from a biodiversity perspective.
- Take into consideration the provincial conservation goals and targets.
- Assess the current ecological status and the conservation priority within the project footprint and adjacent area (as deemed necessary). Provide a concise description of the importance of the affected area to biodiversity in terms of pattern and process, ecosystem goods and services, as appropriate.
- Undertake sensitivity study to identify protected and conservation-worthy species. Prepare a biodiversity sensitivity map with the use of GIS, based on the findings of the study.
- Assess impacts to fauna and flora, associated with the project. Consider cause effect- impact pathways for assessing impacts to biodiversity related to the project.
- Identify potential fatal flaws associated with the project and its alternatives from a biodiversity perspective.

- Comply with specific requirements and guidelines of DEFF.

8.5.2 Heritage Impact Assessment and Paleontology

- Undertake a Heritage Impact Assessment in accordance with the South African Heritage Resources Act (No. 25 of 1999).
- The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of the National Heritage Resources Act, 1999, including archaeological and paleontological sites on or close (within 100 m) of the proposed developments.
- Undertake a desktop palaeontological assessment (evaluate site in terms of SAHRIS).
- The assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- An assessment of the impact of development on such heritage resources.
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development.
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study.
- Identify heritage resources to be monitored.

8.5.3 Air Quality Impact Assessment and Green House Gas/ Climate Change Assessment

- The specifics for this study over and above what has been stated previously and what is required within the NEM:AQA is that the study must:
- Assess the potential impact of regulated emissions on ambient air quality for the proposed plant and advise in respect of atmospheric emissions management requirements; and
- Inform an environmental authorisation application process, and an application for atmospheric emissions licensing, for these proposed upgrades.

8.5.4 Traffic Impact Assessment

The approach that will be followed in conducting this TIA is in accordance with accepted general practice.

The following documents will be consulted:

- Manual for Traffic Impact Studies, Department of Transport, 1995.
- South African Trip Generation Rates, Department of Transport, 1995.
- Committee of Transport Officials (COTO), TMH 17, South African Trip Data Manual, 2012.
- Committee of Transport Officials (COTO), TMH 26, South African Road Classification and Access Management Manual, 2012.
- Committee of Transport Officials (COTO), TMH 17, South African Traffic Impact and Site Traffic Assessment Manual – Volume 1, 2012.

Given the extent and the type of the proposed development, in terms of the aforementioned guidelines, the assessment should therefore consider appropriate target years to analyse the impact on the traffic for both the development and future year horizon.

- Traffic flow data and patterns for the key intersections within an acceptable from radius of the development site will be obtained from the traffic counts.
- Preliminary distribution of the generated traffic.
- An assessment will be made on the performance of the intersections and other traffic elements. For this purpose, the SIDRA INTERSECTION 7.0 software package will be used.
- As per the Highway Capacity Manual (TRB), the minimum level of service on any of the
- elements of the road network is D. In conjunction herewith, the maximum volume capacity ratio (V/C) should be 0.85 at non-signalised and isolated intersections and 0.90 at signalized intersections.
- By taking into account the major findings of the study, the conclusions and recommendations will be made on the need for road upgrading for the scenarios analysed.
- Confirmation of access locations and vehicle circulation concept.
- Input into the conceptual layout and design of the development.

8.5.5 Visual Impact Assessment

Geographical Information Systems (GIS) will be used in this study to generate the visual impact and to apply spatial criteria to the proposed structures. A digital elevation model (DEM) will be generated for the site as well as for 10km of the surrounding area. The DEM is a dataset that displays the local topography of the area, and will be generated using the 5 meter contours sourced from the Chief Directorate National Geo-Spatial Information.

The purpose of this report is to identify and quantify the potential visual impact of the proposed Plant. The following approach will be used to identify key issues for the visual impact:

- A digital elevation model of the study area (10km extent) needs to be created.
- Relevant spatial data including vegetation types, protected areas, cadastral boundaries, existing roads and rail, wetlands, water bodies, rivers, drainage lines, contours, land cover (2015 data) etc. must be sourced.

Sensitive areas and other features that might be negatively affected by the proposed development need to be defined. This includes residential and protected areas. Viewshed analysis is required to determine the visual exposure and the ability of the environment to absorb the visual impact.

8.6 PUBLIC PARTICIPATION IN THE EIA PHASE

8.6.1 Updating of I&APs Database

The I&APs database will be updated as and when necessary during the execution of the EIA.

8.6.2 Review of Draft EIA Report

A 30-day period will be provided to I&APs to review the Draft EIA Report, and copies of the document will be lodged for public review at the following venues:

Copies of the Draft EIA Report will be provided to the regulatory and commenting authorities listed in **Section 3.3.7**. The reports will be distributed for comment as follows:

- Public places such as libraries, municipal offices and community centres throughout the study area where the broader public can have access to it (where applicable);
- CD copy available on request by key stakeholders; and
- Available on the STEC website.

All parties on the I&APs database will be notified via email, fax or post of the opportunity to review the Draft EIA Report at the abovementioned locations, the review period and the process for submitting comments on the report. All comments received from I&APs and the responses thereto will be included in the final EIA Report, which will be submitted to DEFF.

8.6.3 Comments and Responses Report

A Comments and Responses Report will be compiled and included in the EIA Report, which will record the date that issues were raised, a summary of each issue, and the response of the team to address the issue. In addition, any unattended comments from the Scoping Phase or where the status of the previous responses has changed, will also be addressed in the Comments and Responses Report for the EIA phase.

8.6.4 Notification of DEFF Decision

- All I&APs will be notified via email, fax or post after having received written notice from DEFF on the final decision on the application. These notifications will include the appeal procedure to the decision.

8.7 APPROACH TO THE EIA STUDIES

The environmental impacts associated with the proposed project require investigation in compliance with the Environmental Impact Assessment Regulations (2014), as amended and read with Section 24 (5) of the National Environmental Management Act - NEMA (Act No 107 of 1998) (as amended).

The required environmental studies include the undertaking of an Environmental Impact Assessment (EIA) process. An application for Environmental Authorisation has been lodged with the Department of Environment, Forestry and Fisheries (DEFF). This process is being undertaken in two phases that will ultimately allow the competent authority (DEFF) to make an informed decision:

- Phase 1 - Environmental Scoping Study (ESS) and Plan of Study for EIA; and
- Phase 2 - Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr).

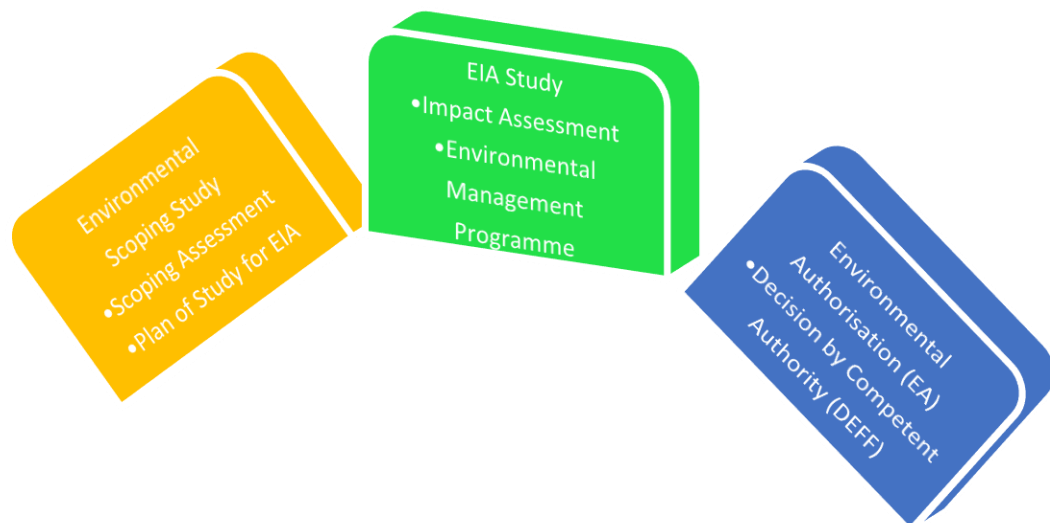


Figure 26: Environmental studies flowchart

Environmental Impact Study

The Environmental Impact Assessment phase will aim to achieve the following:

- To provide an overall assessment of the social and biophysical environments of the affected area by the proposed development of a Gas Engine plant.
- To undertake a detailed assessment of the preferred site/s in terms of environmental criteria including the rating of significant impacts;

- To identify and recommend appropriate mitigation measures (to be included in an EMPr) for potentially significant environmental impacts; and
- To undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded and commented on and addressed in the EIA process.

The following critical components of the EIA Report are highlighted:

- A description of the policy and legislative context;
- A detailed description of the proposed development (full scope of activities);
- A detailed description of the proposed development site, which will include a plan that locates the proposed activities applied for as well as the associated structures and infrastructure;
- A description of the environment that may be affected by the activity and the manner in which physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed development;
- The methodology of the stakeholder engagement process;
- The Comments and Responses Report and I&APs Database will be provided as an appendix to the EIA Report;
- A description of the need and desirability of the proposed development and the identified potential alternatives to the proposed activity;
- A summary of the methodology used in determining the significance of potential impacts;
- A description and comparative assessment of the project alternatives;
- A summary of the findings of the specialist studies;
- A detailed assessment of all identified potential impacts;
- A list of the assumptions, uncertainties and gaps in knowledge;
- An environmental impact statement;
- 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 authorization;
- 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;
- An opinion by the consultant as to whether the development is suitable for approval within the proposed site;
- An EMPr that complies with Appendix 4 of the EIA regulations;
- Copies of all specialist reports appended to the EIA report; and
- Any further information that will assist in decision making by the authorities.

8.8 AUTHORITY CONSULTATION

The EIA will only commence if DEFF accepts the Scoping Report and the Plan of Study for the EIA. If relevant, the necessary revisions will be made to the aforementioned documents if requested by this Department. Copies of the Draft EIA Report will be provided to the key regulatory and commenting authorities.

The final EIA Report will be submitted to DEFF. Any requested amendments will be discussed with the Department to ensure that their queries are adequately and timeously attended to.

For the remainder of the Scoping process and EIA the interaction with DEFF will be as follows:

- Submission of the Final Scoping Report;
- Meet with designated DEFF Environmental Officer to explain the project and arrange a site visit (if required by DEFF);
- Address comments on Scoping Report;
- Arrange an authorities meeting during the EIA stage;
- Submit EIA Report;
- Address comments on EIA Report; and
- Obtain a decision.

9 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this report is to provide the relevant authority with sufficient information on the potential impacts of the proposed development, so that an informed decision can be made with regards to the processes and subsequent authorisation of the proposed development. Potential impacts were identified through preliminary specialist assessment of the site as well as through the technical expertise and experience of the EAP.

The construction and operation of the proposed project, and associated infrastructure can pose various risks to the environment. The issues related to the development will be identified, discussed and assessed in terms of various criteria such as extent, duration, intensity and significance within the EIA phase of the project.

It is believed that the methodology and plan of study that will be used to assess the potential impact of the project will be sufficient to identify potential impacts and recommend appropriate mitigation. This will ultimately assist the DEFF in their decision-making process. It is recommended by the EAP that the proposed project be allowed to proceed to the EIA phase.

10 REFERENCE

- AGES Environmental Impact Report: Proposed solar power generation facilities on the remaining extent of the farm Vetlaagte No. 4, De Aar, Northern Cape Province, Report number AS-R-2013-02-20
- SATIVA Travel and Environmental Consultants (Pty) Ltd, Portion A G5 sites Basic Assessment report, 2020.
- Mucina, L. & M.C. Rutherford (eds). 2006. The vegetation of South Africa, Lesotho and Swaziland. SANBI, Pretoria.
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- Raimondo D., L. von Staden, W. Fonden, JE Victor, NA. Helme, RC. Turner, DA. Kamundi, PA. Manyama (eds). 2009. Red List of South African Plants. Strelitzia 25. SANBI. Pretoria.
- SANBI. South African National Biodiversity website. www.sanbi.org.
- South African National Biodiversity Institute (SANBI). Threatened ecosystems of South African Biomes. Draft 2009. www.sanbi.org or www.bgis.sanbi.org.

APPENDICES